160003

SAUGET AREA 2, SAUGET, IL

RI/FS SUPPORT SAMPLING PLAN VOL. 2C WASTE, SOIL, STORMWATER, GROUNDWATER & AIR HEALTH AND SAFETY PLAN

Prepared for

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SECTIONONE

Administrative Information

Client Name: Sauget Area 2 Site Group Sauget, Illinois Site Location: Sauget, Illinois Site Safety Officer: Steven J. Shroff Effective Dates: February 1, 2001 to December 31, 2001 APPROVAL: Robert Veenstra Date Program Manager Carla J. Dods Date Associate for Safety & Health



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SECTIONTWO

Introduction

This Health and Safety Plan (HASP) has been developed to provide both general procedures and specific requirements to be followed by URS Corporation (URS) personnel and URS subcontractors while performing sampling activities at Sauget Area 2 site, which is located along the Mississippi River in the village of Sauget, Illinois. Figure 1 is a Site Location Map. This HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be used by URS personnel to address potential health and safety hazards while performing the field activities.

URS's Field Sampling Plan (FSP) for the Sauget Area 2 Site dated February 2001 describes the sampling activities to be performed. This HASP specifies procedures and equipment to be used by URS personnel during work activities and emergency response to minimize exposures of URS personnel to hazardous materials.

2.1. IMPLEMENTATION OF THE HASP

The requirements and guidelines presented in this HASP are based on a review of available information and an evaluation of potential on-site hazards. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR Part 1910 29 CFR Part 1926 and EPA Publication 9285.1-03. URS personnel are required to read this HASP before beginning work on-site. This HASP will be available for inspection and review, by URS employees and contractor representatives while work activities are underway. When conducting the sampling activities listed in the FSP, URS personnel will comply with this HASP. On-site URS personnel will notify the URS Site Safety Officer (SSO) of matters of health and safety. The SSO is responsible to the Project Manager for monitoring activities, monitoring compliance with the provisions of this HASP, and for modifying this HASP to the extent necessary if site conditions change (with approval of the Associate for Safety and Health). This HASP is specifically intended for the conduct of activities in the scope of work defined in the FSP and in the areas of the Sauget Area 2 Sites specified for these work activities. Although this HASP can be made available to interested persons for informational purposes, URS does not assume responsibility for the interpretations or activities of any persons or entities other than employees of URS and URS subcontractors.



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2.2. PROJECT ORGANIZATION

Personnel involved in the activities at the Sauget Area 2 Sites implicitly have a part in implementing the HASP. Among them, the Project Officer, the Project Manager, the Corporate Associate for Safety and Health, and the SSO/Field Leader have specifically designated responsibilities. Their names and telephone numbers are listed in Table 2-1. Other key URS project personnel, the project's organization, and other primary contacts for the project are presented in the FSP.

Key project personnel and their responsibilities with regard to the Sauget Area 2 (HASP) are discussed below.

2.2.1 **Project Officer**

Mr. Robert B. Veenstra, is the Project Officer. The Project Officer is responsible for the overall administration and technical execution of the project and financial control. The Project Officer is further responsible for the acquisition and delegation of resources necessary for project completion and HASP implementation.

2.2.2 **Project Manager**

Mr. Robert B. Billman, is the Project Manager. The Project Manager reports to the Project Officer and is directly responsible for the technical progress and financial control of the project. In addition, the project manager is responsible for project safety including implementing the HASP.

2.2.3 Associate for Safety and Health

Ms. Carla J. Dods, is the Corporate Associate for Safety and Health. Ms. Dods will be responsible for review and approval of this HASP and providing safety assistance to the project team. Procedural changes and modifications to this HASP must be approved by Ms. Dods. The Associate for Safety and Health reviews project plans and revisions to plans to verify that safety and health procedures are maintained throughout the investigation. The SSO audits the effectiveness of the HASP on a continuing basis and suggests changes, if necessary, to the Project Manager.



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Site Safety Officer 2.2.4

Mr. Steven J. Shroff, or a designee, is the URS Site Safety Officer (SSO) for this investigation. The SSO for URS employees reports to the URS Project Manager, coordinates his activities with the URS Associate for Safety and Health, establishes operating standards, and coordinates overall project safety and health activities for the site.

Specifically, the SSO is responsible for the following actions:

- Providing a complete copy of the HASP to field staff before the start of activities
- Familiarizing workers with the HASP
- Conducting on-site health and safety training and briefing sessions
- Documenting the availability, use, and maintenance of personal protective and other safety or health equipment
- Maintaining safety awareness among URS employees on-site and communicating safety and health matters to them
- Reviewing field activities for performance in a manner consistent with URS's policy and this HASP
- Monitoring health and safety conditions during field activities
- Coordinating with emergency response personnel and medical support facilities
- Notifying the Project Manager of the need to initiate corrective actions in the event of an emergency, an accident, or identification of a potentially unsafe condition
- Notifying the Project Manager of an emergency, an accident, the presence of a potentially unsafe condition, a health or safety problem encountered, or an exception to this HASP
- Recommending improvements in safety and health measures to the Project Manager.

The SSO has the authority to take the following actions:

- Temporarily suspend field activities or otherwise limit exposures if the health or safety of any URS employee appears to be endangered
- Notify URS personnel to alter work practices that the SSO deems to not protect them



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Temporarily suspend an URS employee from field activities for violating the requirements of this HASP.

The tasks to be conducted in the sampling areas include:

- Trenching
- Soil gas sampling
- Magnetometer survey
- Installation of soil borings and collection of cuttings
- Installation of trenches and waste characterization
- Installation and sampling of groundwater monitoring wells and piezometers
- Surface and subsurface soil sampling
- Air sampling
- Storm water sampling
- Surveying.

The details of these tasks are presented in the FSP and will be conducted in accordance with the procedure outlined in the FSP. Both the potential health and safety hazards and the hazard and contaminant control procedures for each task are discussed below. Based on the available soil and water data, there is a potential for exposure to soil and water constituents as particulates or vapors above the OSHA-permissible exposure level (PEL). Skin contact with impacted soil and liquid should be minimized in accordance with good work practices.

Tables for establishing action levels for site-related constituents are presented in Appendix C. The action levels are based on prior soil and groundwater analytical data reviewed by URS.

The tables in Appendix C were used to estimate the maximum potential for release of the volatile and semi-volatile compounds identified as being present in the soil and groundwater at the site (based on previous site investigations). The tables used the saturation vapor pressure and water solubility of these volatile and semi-volatile materials to estimate the potential levels of volatile and semi-volatile compounds that could be released at the surface of the soil or groundwater.



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The levels of volatile and semi-volatile compounds on the site vary with location. To approximate worst-case conditions, the levels used in this table are the maximum reported.



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Due to dilution and dispersion, the estimated airborne release levels in the breathing zones of site workers are expected to be much lower than source levels. Although the concentration of compounds will decrease with dilution, the proportions within the mix are assumed to remain constant. The proportion of the vapors reaching the breathing zone is thus expected to remain the same as that at the surface of the soil or the groundwater.

There is a potential for exposure to VOCs, SVOCs, PCBs, Dioxins, and metals from the soils. A complete list of known soil contaminants is provided in Table 3. Generic MSDSs for these materials are attached in Appendix D.

There is the potential to exposure from VOCs, SVOCs, PCBs, Dioxins, and metals from the ground and/or surface water. A complete list of known groundwater contaminants is provided in Table 4. Generic MSDSs for these materials are attached in Appendix B.

3.1. **TRENCHING**

Test trenches will be completed to delineate site boundaries and to uncover magnetic anomalies. Photos will be taken of the sides and bottoms of the trenches. Spoil from the trenches will be returned to the excavation in reverse order of removal. Maximum anticipated depth of the trenches is 40 ft below grade. URS employees will not enter the trenches. Whole drums encountered during the magnetic anomaly test trench completion will be removed from the trenches in accordance with the procedures described in section 3.8 of this HASP. A "competent person", as defined in 29 CFR 1926.650, will observe the trenching activities and will have authorization to take corrective measures to respond to unsanitary, hazardous, or dangerous conditions to workers. In addition, the protective system(s) used during trenching activities will be reviewed by a registered Professional Engineer.

3.1.1 Potential Health Hazards and Hazardous Constituents

During the trenching operations, there is the potential for the release of volatile organic material and contact with semi-volatile and particulate materials. There is the potential for the sides of the trench to cave in. The possibility exists for splashing of water onto the workers and release of volatile materials onto workers' bodies and into the workers' breathing zones. This may also cause a reduction in the oxygen level in the trench. There is the possibility of injury due to being struck by heavy equipment.



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Hazard Analysis

Hazard and Hazardous Constituent Control 3.1.2

Level C PPE consisting of an air purifying respirator with organic vapor cartridges, a chemical resistant overall, chemical resistant steel-toed boots or equivalent, nitrile gloves, and eye protection will be worn while observing the trenching activities.

Trenching will be conducted in accordance with the requirements of Subpart P of 29 CFR 1926. The trenches during investigation will be continually inspected by the "competent person," with changing conditions noted and work modifications made. The sides of the trench will be sloped or a trench box will be used as necessary to minimize the potential for cave-ins. Material excavated from the trenches will be placed away from the edge of the trench to prevent cave-ins and minimize instability of the trench. During trench construction, air in the breathing zone of the workers will be sampled for VOCs using a photoionization detector (PID) and for dangerous vapors using a combustible gas monitor (CGM) for dust using a Real-time areasol monitor (RAM). Subsequent monitoring and respirator wear will be in accordance with Section 7 of this HASP. Personnel must wear hearing protection when working near operating heavy machinery and will remain upwind from vehicle exhaust.

Measurement equipment will be decontaminated in accordance with the guidelines in URS's Quality Assurance Program Plan (QAPP) dated February 2001 and in Section 7 of this HASP. Field decontamination wastes will be collected, drummed, and disposed in accordance with the procedures in the FSP.

3.2 SOIL GAS SAMPLING

Soil gas samples will be collected to delineate the areal extent of VOC containing soils at Sites O, P, Q, R, and S.

Potential Health Hazards and Hazardous Constituents 3.2.1

There is the potential for contact with soil contaminants; the release of organic vapors from the subsurface soils; for musculoskeletal injuries when installing the soil gas probes and from bending to collect the samples; for back strain due to lifting probes and hammers and moving equipment; and the potential to get dirt in the eyes. Other hazards associated with soil gas sampling include slipping on wet, muddy surfaces created by spilled water and electrical hazards associated with the use of electrical equipment around water or wet surfaces.



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VOCs may be present within and released from samples collected. The potential exists for release of these materials into the atmosphere at levels that may present an inhalation hazard. There is minimal potential for these levels to reach sustained explosive concentrations.

3.2.2 Hazard and Hazardous Constituent Control

Level C PPE consisting of an air purifying respirator with organic vapor cartridges, a chemical resistant overall, chemical resistant steel-toed boots or equivalent, nitrile gloves, and eye protection will be worn when initiating probing at a location. Before and during soil gas sampling activities, air in the general area will be checked with a PID and a CGM. Downgrading of respiratory protection and air monitoring activities will be in accordance with Section 7 of this HASP. Personnel must wear hearing protection when working near operating heavy machinery and will remain upwind from vehicle exhaust.

A ground fault circuit interrupter will be used in the absence of properly grounded circuitry or when electrical equipment is used in wet conditions. Electrical extension cords used will be protected or guarded from damage and be maintained in good condition.

Back strain can be prevented by employing proper lifting and bailing techniques. Heavy equipment, such as pumps and generators, will only be lifted with the legs, preferably using two or three personnel. Slipping on wet surfaces will be minimized by placing purged water in drums for removal. Also, boots with good treads will be worn, and personnel will be reminded to remain alert of the area where they are walking to decrease the chance of slipping.

Equipment will be decontaminated in accordance with the guidelines in the QAPP and in Section 9 of this HASP. Purged water and decontamination wastes will be collected, drummed, and disposed in accordance with the FSP.

3.3 NON-INTRUSIVE SURVEYING (LAND SURVEY AND MAGNETOMETER)

Magnetometer surveys will be conducted at Sites P, Q, R, and S to identify anomalies indicative of drum disposal or buried tanks.

3.3.1 Potential Health Hazards and Hazardous Constituents

General hazards associated with a site walk-through and/or a magnetometer survey include exposure to irritant and toxic plants such as poison ivy and sticker bushes which may cause



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allergic reactions to personnel; surfaces covered with heavy vegetation and under growth that may create a tripping hazard; uneven terrain that may cause slip, trips and fall hazards, back strain due to carrying instruments; and native wildlife such as rodents, ticks, and snakes that present the possibility of insect bites and associated diseases such as Lyme disease. There may also be contact with chemical hazards due to disturbances of possibly impacted areas.

Hazard and Hazardous Constituent Control 3.3.2

Modified Level D PPE will be worn. Personnel will carry the appropriate first aid for known allergic reactions. Personnel will be cautioned to remain alert and observe terrain while walking to minimize slips and falls. Proper lifting techniques will be used to prevent back strain. Personnel will be warned to avoid wildlife when possible. In case of an animal bite, personnel will perform first aid and capture the animal, if possible, for rabies testing. Personnel will perform a tick check after leaving a wooded or vegetated area.

To minimize exposure to volatiles during the magnetometer survey, air in the breathing zone of the sampler will be sampled for VOCs using a PID. Subsequent monitoring and respirator wear will be in accordance with Section 7 of this HASP.

To minimize contact with irritant and toxic plants and to protect against insect bites, Level D protection will include long sleeve shirts and slacks.

Measurement equipment will be decontaminated in accordance with the guidelines in the OAPP and in Section 9 of this HASP.

INSTALLATION OF SOIL BORINGS AND COLLECTION OF CUTTINGS 3.4

Soil borings will be performed to identify subsurface materials. The soil samples from the borings will be collected, examined, and prepared for shipment. Cuttings will be collected, drummed, and disposed in accordance with the FSP.

Potential Health Hazards and Hazardous Constituents 3.4.1

Hazards generally associated with drilling operations include noise levels exceeding the OSHA PEL of 90 dBA that are both a hazard and a hindrance to communication, carbon monoxide from the drill rig, and overhead electrical and telephone wires which can be hazardous when the drill rig boom is in the upright position. Moving parts on the drill rig may catch clothing. Free or



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falling parts from the cat head may cause head injury. Moving the drill rig over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. High pressure hydraulic lines and air lines used on drill rigs are hazardous when they are in disrepair or incorrectly assembled. There may be aboveground and underground utilities in the area where drilling is being performed.

During the retrieval of augers and during the piling of cuttings, the possibility exists for splashing of exposed subsurface materials onto the workers and release of dust and volatile materials onto workers' bodies and into the workers' breathing zones.

There is the potential for combustible gases to be released during the soil borings. Other hazards generally encountered during soil boring and sample collection include exposure to vapors and contact with hazardous materials. Volatile organic vapors may be released from the cuttings.

3.4.2 Hazard and Hazardous Constituent Control

Personnel must wear hard hats and ear muffs and/or ear plugs when working near operating heavy machinery. Level C PPE consisting of an air purifying respirator with organic vapor cartridges, a chemical resistant overall, chemical resistant steel-toed boots or equivalent, nitrile gloves, and eye protection will be worn during drilling activities as described in Section in 5.2. Loose clothing will be secured and the boom position will be checked prior to approaching the drill rig.

URS personnel will remain upwind from the vehicle exhausts unless required by sampling work. During drilling, if wet methods are not used, air in the breathing zone of the worker will be sampled for respirable dust using a RAM at approximately five-minute intervals. Air will be continuously sampled for volatile organic vapors and combustible gasses using a PID and CGM respectively. Subsequent monitoring and respirator wear will be in accordance with Section 7 of this HASP.

A ground fault interrupter will be used in the absence of properly grounded circuitry or when pumps are used around wet conditions. Electrical extension cords will be protected or guarded from damage and be maintained in good condition. The drilling subcontractor will be required to inspect chains, lines, and high-pressure lines daily for weak spots, frays, and other signs of wear. The drilling subcontractor will be required to make repairs as necessary. To avoid contact with



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overhead lines, the drilling subcontractor will be required lower the drill rig boom prior to moving the rig. The drilling subcontractor will be required to verify the location of overhead and underground utilities with both the facility and the local power and utility companies prior to drilling. Overhead and underground utilities will be considered "live" until verified otherwise.

Equipment will be decontaminated in accordance with the guidelines in the QAPP and in Section 9 of this HASP. Cuttings and decontamination wastes will be collected, drummed, and disposed in accordance with the FSP.

INSTALLATION AND SAMPLING OF GROUNDWATER WELLS 3.5

Groundwater monitoring wells will be installed, developed, and sampled.

Potential Health Hazards and Hazardous Constituents 3.5.1

Hazards generally associated with drilling operations include noise levels exceeding the OSHA PEL of 90 dBA that are both a hazard and a hindrance to communication, carbon monoxide from the drill rig, and overhead electrical and telephone wires which can be hazardous when the drill rig boom is in the upright position. Moving parts on the drill rig may catch clothing. Free or falling parts from the cat head may cause head injury. Moving the drill rig over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. High pressure hydraulic lines and air lines used on drill rigs are hazardous when they are in disrepair or incorrectly assembled. There may be underground utilities in the area where drilling is being performed. Mixing and installing grout is a physical and chemical hazard.

During the retrieval of augers, the possibility exists for splashing of exposed subsurface materials onto the workers and release of dust and volatile materials onto workers' bodies and into the workers' breathing zones.

There is the potential for combustible gases to be released during the installation of new monitoring wells. Other hazards generally encountered during well installation and groundwater sampling include exposure to vapors and contact with hazardous materials. Volatile organic vapors may accumulate in the wells.



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Hazard and Hazardous Constituent Control 3.5.2

Personnel must wear hard hats and ear muffs and/or ear plugs when working near operating heavy machinery. Level C PPE consisting of an air purifying respirator with organic vapor cartridges, a chemical resistant overall, chemical resistant steel-toed boots or equivalent, nitrile gloves, and eye protection will be worn during drilling and monitoring well installation as described in Section 5.2. Loose clothing will be secured and the boom position will be checked prior to approaching the drill rig.

URS personnel will remain upwind from the vehicle exhausts unless required by sampling work. During drilling, if wet methods are not used, air in the breathing zone of the worker will be sampled for respirable dust using a RAM at approximately five-minute intervals. Air will be continuously sampled for volatile organic vapors and combustible gases using a PID and CGM respectively. Subsequent monitoring and respirator wear will be in accordance with Section 7 of this HASP.

A ground fault interrupter will be used in the absence of properly grounded circuitry or when pumps are used around wet conditions. Electrical extension cords will be protected or guarded from damage and be maintained in good condition. The drilling subcontractor will be required to inspect chains, lines, cables, and high-pressure lines daily for weal spots, frays, and other signs of wear. The drilling subcontractor will be required to make repairs as necessary. To avoid contact with overhead lines, the drilling subcontractor will be required to lower the drill rig boom prior to moving the rig. The drilling subcontractor will be required to verify the location of overhead and underground utilities with both the facility and the local power and utility companies prior to drilling. Overhead and underground utilities will be considered "live" until verified otherwise.

Equipment will be decontaminated in accordance with the guidelines in the QAPP and in Section 9 of this HASP. Cuttings and decontamination wastes will be collected, drummed, and disposed in accordance with the FSP.

3.6 SURFACE AND SUBSURFACE SOIL SAMPLING

Soil samples will be collected from the first 6 inches of the surface and from 0.5 to 6 ft below the surface using direct push technologies.



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Potential Health Hazards and Hazardous Constituents 3.6.1

There is the potential for contact with soil contaminants, the release of organic vapors from the subsurface soil samples, for musculoskeletal injuries when using the geoprobe and bending to collect the samples, and the potential to get dirt in the eyes. Also geoprobes pose a noise hazard and a pinching hazard due to many pinch points on the rig. Other hazards associated with soil sampling include slipping on wet muddy surfaces created by spilled water and electrical hazards associated with the use of electrical equipment around water or wet surfaces.

Hazard and Hazardous Constituent Control 3.6.2

Personnel must wear hard hats and ear muffs and/or ear plugs when working near operating heavy machinery. Level C PPE consisting of an air purifying respirator with organic vapor cartridges, a chemical resistant overall, chemical resistant steel-toed boots or equivalent, nitrile gloves, and eye protection will be worn during drilling activities. Before and during soil sampling, air in the general area will be monitored with a PID and CGM as described in Section 5.2. Respiratory protection and air monitoring activities will be in accordance with Section 7 of this HASP. Personnel must wear hearing protection when working near operating heavy machinery and will remain upwind from vehicle exhaust.

A ground fault circuit interrupter will be used in the absence of properly grounded circuitry or when electrical equipment is used in wet conditions. Electrical extension cords used will be protected or guarded from damage and be maintained in good condition.

Back strain can be prevented by employing proper lifting and bailing techniques. Heavy equipment, such as pumps and generators, will only be lifted with the legs, preferably using two or three personnel.

Equipment will be decontaminated in accordance with the guidelines in the QAPP and in Section 9 of this HASP. Purged water and decontamination wastes will be collected, drummed, and disposed in accordance with the FSP.

3.7 AIR SAMPLING

Samples of ambient air surrounding the site will be collected to evaluate the tendency for site constituents to enter the atmosphere and local wind patterns.



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Potential Health Hazards and Hazardous Constituents 3.7.1

There is the potential for musculoskeletal injuries when installing the ambient air samplers and from reaching to collect the samples. There is also the potential to get dirt in the eyes. Other hazards associated with air sampling include slipping on wet, muddy surfaces and electrical hazards associated with the use of electrical equipment around water or wet surfaces. The uneven terrain may cause slip, trip, and fall hazards.

VOCs may be present in the area from which the samples are collected. The potential exists for release of these materials into the atmosphere at levels that may present an inhalation hazard.

Hazard and Hazardous Constituent Control 3.7.2

Level D PPE, consisting of leather steel-toed boots, gloves, and eye protection, will be worn. Before initiating air sampling, air in the general area will be checked with a PID. Respiratory protection and air monitoring activities will be in accordance with Section 7 of this HASP. Personnel must wear hearing protection when working near operating heavy machinery and will remain upwind from vehicle exhaust.

A ground fault circuit interrupter will be used in the absence of properly grounded circuitry or when electrical equipment is used in wet conditions. Electrical extension cords used will be protected or guarded from damage and be maintained in good condition.

Back strain can be prevented by employing proper lifting techniques. Heavy equipment, such as pumps and generators, will only be lifted with the legs, preferably using two or three personnel. Boots with good treads will be worn, and personnel will be reminded to remain alert of the area where they are walking to decrease the chance of slipping.

Equipment will be decontaminated in accordance with the guidelines in the QAPP and in Section 9 of this HASP.

3.8 REMOVING DRUMS AND OTHER MATERIAL FROM TRENCHES

While performing test trenches to investigate magnetic anomalies, whole drums may be removed from the trenches and overpacked. These activities will be performed without anyone entering the trenches.



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Potential Health Hazards and Hazardous Constituents 3.8.1

Drums containing potentially hazardous materials may be removed from trenches. The possibility exists for splashing material onto the workers and the release of dust and volatile materials onto workers' bodies and into the workers' breathing zones. These materials, if encountered, may be spread through the air and through skin contact with impacted soil and water. Back strain and muscle fatigue due to lifting, shoveling, and auguring techniques are possible. There is the potential for combustible gases to be released during the drum removal.

During the excavation process, the backhoe may slide or sink, causing possible injuries to on-site employees. The sides of the excavation can cave in due to 1) absence of shoring, 2) misjudgment of stability, 3) defective shoring, and/or 4) undercut sides. The cave-in may result in possible burying or crushing of workers. Workers can fall during access/egress or while monitoring or dismounting equipment, or can stumble into the excavation. An overhead hazard can result from material, tools, rock, and/or soil falling into the excavation.

The work area may become congested due to too many workers being present in a small area. During the removal, there is the potential for rupture of the drum and the release of its contents onto the soil and into the air.

Hazard and Hazardous Constituent Control 3.8.2

Level C PPE consisting of an air purifying respirator with organic vapor cartridges, a chemical resistant overall, chemical resistant steel-toed boots or equivalent,, nitrile gloves, and eye protection will be worn during drum removal. The air in the work area will be monitored continuously during removal activities using a PID, CGM and a RAM. Subsequent monitor and respirator wear will be in accordance with Section 7 of this HASP. URS personnel will remain at least 5 ft clear from the removal activities and will not enter the trenches. Personnel must wear hearing protection and hard hats when working near operating heavy machinery.

Warning tape will be placed around the work areas to restrict entrance during the drum excavation process and prevent the spread of contaminants, which maybe encountered. A barrier around the open pits will be provided.



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SECTIONTHREE

Hazard Analysis

The contractor removing the drum will provide overpack drums and trained employees to perform the drum removal. Drum handling procedures must meet the requirements of 29 CFR 1910.120(j).

Material excavated from each pit will be placed away from the edge of the pit to prevent cave-ins and minimize instability of the pit. Shoring or sloping of sides of the excavation in accordance with 29 CFR 1926.650-652.

The URS oversight personnel will maintain ample work room between the workers. Manual lifting will be limited to prevent overexertion, and mechanical means will be used where practical.

Equipment will be decontaminated in accordance with the guidelines in the QAPP and in Section 9 of this HASP.



SECTIONFOUR

Personnel Training

4.1 SITE WORKERS

URS employees performing the activities listed in the Field Sampling Plan must have completed a training course of at least 40 hours meeting the requirements of 29 CFR 1910.120(e) for safety and health at hazardous waste operations. If the course was completed more than 12 months before the date of site work, completion of an approved 8-hr refresher course on health and safety at hazardous waste operations is required.

URS employees must comply with the URS Safety Management Standards (SMSs) which are provided in Appendix B.

4.2 MANAGEMENT AND LEADERS

In addition to the requirements described in section 4.1 for URS site workers, URS field leaders must have completed an off-site training course of at least 8 hours meeting the requirements of 29 CFR 1910.120(e) on supervisor responsibilities for safety and health at hazardous waste operations.

4.3 **EMERGENCY RESPONSE PERSONNEL**

URS employees who respond as "Good Samaritans" to emergency situations involving health and safety hazards must be trained in how to respond to such emergencies in accordance with the provisions of 29 CFR 1910.120(1). Skills such as cardiopulmonary resuscitation (CPR), mouthto-mouth rescue breathing, avoidance of blood-borne pathogens, and basic first aid skills may be necessary.

A minimum of one URS on-site individual will be trained in first-aid.

4.4 SITE-SPECIFIC TRAINING

Site-specific training will be provided to each URS employee and reviewed before assignment. URS personnel will be briefed daily by the SSO/Field Leader as to the potential hazards that may be encountered during that day. Topics will include:

- Availability of this HASP
- General site hazards and specific hazards in the work areas



SECTION FOUR

Personnel Training

- Selection, use, testing, and care of the body, eye, hand, foot, and respiratory protective equipment being worn and the limitations of each
- Decontamination procedures for URS personnel, their personal protective equipment, and other equipment used on-site
- Emergency response procedures and requirements
- Emergency notification procedures and evacuation routes to be followed
- Procedures for obtaining emergency assistance and medical attention.

TRAINING CERTIFICATION 4.5

A record of employee training completion will be maintained by the SSO for each URS employee who is trained. This record will include the dates of the completion of worker training, supervisor training, refresher training, emergency response training, and site-specific training for on-site URS employees.

4.6 SPECIALIZED TRAINING

URS policy requires 4 hours of additional training to perform work in Level B.



SECTIONFIVE

Personnel Protection

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The basic level of PPE to be used at the Sauget Area 2 Sites during intrusive activities is Level C and during non-intrusive activities is a modification of OSHA Level D. PPE may be upgraded based on air monitoring results or at the discretion of the Project Manager and based on the SSO's recommendations. A downgrade of PPE must be approved by the Associate for Safety and Health and the Project Manager.

If the SSO verifies that field measurements or observations indicate that a potential exposure is greater than the protection afforded by the equipment or procedures specified in this or other sections of this HASP, the work will be stopped, and URS personnel will be removed from the site until the exposure has been reduced or the level of protection has been increased.

URS respirator users have been trained and medically approved to use respiratory protection. Respirators issued are approved for protection against dust and organic vapors by NIOSH. Respirators are issued for the exclusive use of one worker and will be cleaned and disinfected after each use by the worker. Respirator users must check the fit of the respirator before each day's use to see that it seals properly. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator. No facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory PPE. Cartridges and filters for air-purifying respirators in use will be changed daily at a minimum. The user will inspect the integrity of air-purifying respirators daily.

5.1 PROTECTIVE EQUIPMENT DESCRIPTION

The level of PPE is categorized as Level A, B, C, or D, based upon the degree of protection required. The following is a brief summary of the three levels that may be used on this site.

5.1.1 Level B

The concentration(s) and type(s) of airborne substance(s) is unknown and the criteria for not using a totally encapsulating suit are met. The following constitute Level B equipment:

- NIOSH-approved, positive pressure, full-face air supplying respirator or self contained breathing apparatus (SCBA).
- Chemical-resistant clothing
- Coveralls (optional)



SECTIONFIVE

Personnel Protection

- Gloves, outer, chemical-resistant (neoprene)
- Gloves, inner, chemical-resistant (nitrile or latex)
- Boots, outer, chemical-resistant, with steel toe and shank or equivalent
- Chemical resistant boot covers (neoprene or butyl rubber)
- Hard hat (Class B)
- Personal flotation device with rope when sampling in water greater than 24 inches deep
- Hearing protection when working in noise hazardous areas, as defined in URS's Quality Assurance Manual
- Tape wrists and ankle joints.

Level C 5.1.2

The concentration(s) and type(s) of airborne substance(s) is known-and the criteria for using air purifying respirators are met. The following constitute Level C equipment:

- NIOSH-approved, full-face air purifying respirator with organic vapor cartridges and P100 particulate filters
- Chemical-resistant clothing
- Coveralls (optional)
- Gloves, outer, chemical-resistant (neoprene)
- Gloves, inner, chemical-resistant (nitrile or latex)
- Boots, outer, chemical-resistant, with steel toe and shank or equivalent
- Optional chemical resistant boot covers (neoprene or butyl rubber)
- Hard hat (Class B)
- Personal flotation device with rope when sampling in water greater than 24 inches deep
- Face shield and safety glasses when not wearing a full face respirator
- Tape wrists and ankle joints



SECTIONFIVE

Personnel Protection

Hearing protection when working in noise hazardous areas, as defined in URS's Ouality Assurance Manual.

5.1.3 **Modified Level D**

The concentration(s) and type(s) of airborne substance(s) is known and the criteria for not using air purifying respirators are met. A level of skin protection above Level D is required. The following constitute Modified Level D equipment:

- Tyvek® or equivalent disposable chemical resistant overalls
- Coveralls (optional)
- Gloves, outer, chemical-resistant (neoprene)
- Gloves, inner, chemical-resistant (nitrile or latex)
- Boots, outer, chemical-resistant, with steel toe and shank or equivalent
- Optional chemical resistant boot covers (neoprene or butyl rubber)
- Hard hat (Class B)
- Personal flotation device with rope when sampling in water greater than 24 inches deep
- Face shield and safety glasses
- Hearing protection when working in noise hazardous areas, as defined in URS's Quality Assurance Manual.

5.1.4 Level D

A work uniform affording minimal protection, used, for nuisance contamination only. The following constitute Level D equipment:

- Long-sleeve shirt
- Gloves (neoprene or leather)
- Boots or shoes, leather, steel toe and shank
- Optional chemical resistant boot covers (neoprene or butyl rubber)
- Safety glasses or chemical splash goggles



SECTIONFIVE

Personnel Protection

- Hard hat (Class B)
- Personal flotation device with rope when sampling in water greater than 24 inches deep
- Escape mask (optional)
- Face shield when not wearing other eye protection.
- Hearing protection when working in noise hazardous areas, as deemed in URS's Quality Assurance Manual.

PROTECTIVE EQUIPMENT SELECTION 5.2.

Initial levels of PPE will be as shown in the following table:

			Modified	
<u>Activity</u>	Level B	<u>Level C</u>	Level D	Level D
Trenching		Observation		
Soil Gas Sampling		Initial		
Magnetometer Survey			Initial	
Installation of soil borings and collection of cuttings		Initial		
Installation and sampling of groundwater wells	•	Initial		
Surface and subsurface soil sampling		Initial		
Air sampling			Initial	

5.3 PROTECTIVE EQUIPMENT FAILURE

If an individual experiences a failure or other alteration of PPE that may affect its protective ability, that person is to leave the work area immediately. The Project Manager or the SSO must be notified and, after reviewing the situation, is to evaluate the effect of the failure on the continuation of on-going operations. If the Project Manager or the SSO ascertains that the failure affects the safety of workers, the work site, or the surrounding environment, workers are to be evacuated until corrective actions have been taken. The SSO will not allow re-entry until the equipment has been repaired or replaced and the cause of the failure has been identified.



SECTIONSIX

Medical Monitoring

6.1 MEDICAL SURVEILLANCE PROGRAM

URS has implemented a medical monitoring program in accordance with 29 CFR 1910.120. The URS program is designed to monitor and reduce health risks to employees potentially exposed to hazardous materials and to provide baseline medical data for each employee involved in work activities. It is also designed to evaluate the employee's ability to wear PPE such as chemicalresistant clothing and respirators.

Medical examinations are administered on a post-hire and annual basis and as warranted by symptoms of exposure or specialized activities. The post-hire examination provides baseline data. The examining physician is required to make a report to URS of any medical condition that would increase the employee's risk when wearing a respirator or other PPE. URS maintains site personnel medical records as required by 29 CFR 1910.120, as applicable.

URS employees performing the activities listed in the FSP or this document have or will receive medical tests as regulated by 29 CFR 1910.120. Where medical requirements of 29 CFR 1910. 120 overlap those of 29 CFR 1910.134 or 29 CFR 1910.1025, the more stringent standard will be enforced.

6.2 RESPIRATOR CERTIFICATION

Employees who wear or may wear respiratory protection have been provided respirators as required by 29 CFR 1910.134. This standard requires that an individual's ability to wear respiratory protection be medically certified before performing designated duties.



SECTIONSEVEN

Air Monitoring

The air will be monitored in the breathing zone with a PID and a RAM to assess the presence and concentration of organic vapor and airborne dusts (respectively) during drilling and sampling activities. The air will be monitored with a combustible gas monitor during intrusive work to detect the presence of combustible concentrations of materials. The monitoring strategies described below may change if work tasks or operations change. Monitoring instruments will be checked for appropriate response, in accordance with the manufacturer's instructions, before use each sampling day. The manufacturers operation and maintenance manual are provided in Appendix F.

Action levels are used to ascertain when activities should stop, when site evacuation is necessary, to select emergency response levels, and to change PPE levels.

7.1 ORGANIC AND INORGANIC VAPORS

There is the potential for hazardous materials to be present at the Sauget Area 2 Sites at levels that will pose a health hazard to workers. Real time monitoring of organic vapors will be conducted on-site by, or under the supervision of the SSO, to evaluate the concentrations of organic vapors and site-generated dusts. The SSO will evaluate whether the personal protective measures employed during field activities are appropriate and will modify the protective measures accordingly. Field personnel will record equipment calibrations, repairs, and readings in a notebook that is a part of the site log. The SSO will be responsible to maintain monitoring instruments throughout the investigation.

7.1.1 Photoionization Detector (PID)

A PID monitors the air for many organic and some inorganic gases and vapors. A portable PID equipped with a 10.2 or 11.7 electron volt detector, as appropriate, will be used during the length of the project to assess the presence and concentration of VOCs. Ionization potential tables are included in Appendix C for reference. Air will be monitored in the breathing zone of the URS worker at approximately five-minute intervals. The PID will be checked for positive and accurate response to a pre-established concentration of isobutylene in accordance with the manufacturer's instructions before use each sampling day.

Before the start of work, the PID will be used to assess the concentration of VOCs upwind from the work area. When VOC levels exceed the action level, the PID will be used to measure the VOC level downwind from the work area.



SECTIONSEVEN

Air Monitoring

The batteries will be recharged or replaced daily and the lamp window will be cleaned regularly.

7.1.2 **Action Levels**

Organic vapors may be liberated from the groundwater or from the soil during site activities. A PID will be used to assess the presence of total organic vapors.

There is a potential for exposure to VOCs, SVOCs, PCBs, Dioxins, and metals from the soils. A complete list of known groundwater contaminants is provided in Table 3. Generic MSDSs for these materials are attached in Appendix D.

There is the potential to exposure from VOCs, SVOCs, PCBs, Dioxins, and metals from the ground and/or surface water. A complete list of known groundwater contaminants is provided in Table 4. Generic MSDSs for these materials are attached in Appendix B.

Actions, such as increasing ventilation, may be implemented to promote dispersion of the vapors. if present. If not already in Level C PPE, an air purifying respirators and chemical resistant clothing will be donned by on-site employees at sustained VOC concentrations of 3 ppm above background in the breathing zone. Colorimetric tubes will be used to measure benzene concentrations in the breathing zone at sustained levels of 3 ppm VOCs. Work may continue until the measured VOC concentration is greater than or equal to 30 ppm or benzene levels exceed 1 ppm on a consistent basis. At that time, the workers will leave that work area or upgrade to Level B. Actions, such as increasing ventilation, may be implemented to promote dispersion of the vapors.

7.2 **PARTICULATES**

7.2.1 Real Time Aresol Monitor (RAM)

A RAM monitors the total dust concentration in the air. A RAM will be used to assess the presence and concentration of respirable dust during field activities. During drilling, if wet methods are not used, monitoring in the breathing zone of the URS worker will be performed at approximately five-minute intervals. The RAM will be checked, in accordance with the manufacturer's operating instructions, prior to use each sampling day for appropriate responses.



SECTIONSEVEN

Air Monitoring

The batteries will be recharged or replaced daily and the desiccant will be replaced when necessary. The RAM will be checked, in accordance with the manufacturer's instructions, for appropriate responses prior to each use.

Action Levels 7.2.2

There is the potential for exposure to arsenic, barium, beryllium, cadmium, copper, dioxin, lead, selenium and vanadium in the dust generated during activities on the site. Generic MSDS for these materials are attached in Appendix D. A total dust action level of 0.03 mg/rn³ (30 µg/m³) has been established.

When respirable particulates are detected at 0.03 mg/m³ or greater, a full-face respirator with P100 filters will be worn, if the employee is not already in Level C. Employees will leave the work area or upgrade to Level B when the respirable dust concentration exceeds 1 mg/m³. Dust suppression techniques (e.g., water application and activity controls) may be implemented to reduce the generation of dust.

Upon visual observation of air-borne particulate matter associated with on-site activities, a water spray will be applied as a control measure. If a water spray cannot be applied, additional personal monitoring will be undertaken to assess whether correct personal protective measures are being taken.

7.3 COMBUSTIBLE GAS VAPORS

7.3.1 **Combustible Gas Monitor (CGM)**

A CGM measures the concentration of combustible gases or vapors. A portable CGM will used continuously to assess the presence and concentration of combustible gases and vapors, during intrusive activities. The CGM will be programmed to sound an alarm when the combustible gas concentration exceeds 20% of the lower explosive limit (LEL) for methane. During trench excavation, the CGM will be programmed to respond at 10% of the LEL. The CGM will be checked for appropriate response, in accordance with the manufacturer's instructions, before use each sampling day.

The batteries will be recharged or replaced daily and the CGM calibrated immediately before use.



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SECTIONSEVEN

Air Monitoring

7.3.2 **Action Levels**

Explosive levels of gases and vapors may accumulate in wellheads and low locations on the site. A CGM will be used during intrusive work to assess the level of combustible gas. An action level of 20% of the LEL for methane will be used for work outside of trenches. An action level of 10% of the LEL will be used during trench excavations. Work will cease at any location where the explosive gas reading exceeds the action level. Actions, such as increasing ventilation, will be taken to disperse the combustible gas from that area. If the combustible gas level does not decrease within 10 minutes, the SSO will contact the Cahokia and Sauget Fire Department for assistance. Although personnel are not required to vacate the area until the LEL reaches the action level (10% or 20%), they may not return until the LEL is below 5% or 15%, respectively.



SECTIONEIGHT

Site Control

8.1 SITE SECURITY

Site security will be monitored and controlled by the Project Manager, and the SSO/Field Leader. Their duties will include limiting access to the work area to authorized personnel, maintaining a sign-in roster, overseeing project equipment and materials, and overseeing work activities. The procedures specified below will be followed to control access to each work site to prevent persons who may be unaware of site conditions from exposure to hazards. Work area control procedures may be modified as required by activity and site conditions. Site security will be established on a site- and activity-specific basis.

8.2 SITE CONTROL

An exclusion zone and a contamination reduction zone will be established by the SSO/Field Leader at each sampling and drilling point. The remainder of the Sauget Area 2 Sites will be the support zone. A map depicting the exclusion zone, contamination reduction zone, and support zone will be prepared and posted in the support zone. The layout of the zones, the procedures to be followed for zone control, and the signs used to indicate the zones will be reviewed during the daily safety briefings before beginning the day's work. The general area of the zones for each day will be identified by the SSO/Field Leader during the daily site briefing. This information will be included in the daily site log.

8.2.1 **Exclusion Zone**

The exclusion zone is where sampling and observation of drilling activities are conducted. The SSO will identify this zone. It must be at least 30 ft in diameter and centered, when possible, on the work activities. This zone will be designated with flagging or equivalent attached to portable stakes or cones installed before beginning the fieldwork. The zone may be enlarged to contain the necessary ancillary equipment and personnel for the work to be done.

8.2.2 **Contamination Reduction Zone**

The contamination reduction zone (CRZ) contains personnel and equipment decontamination stations. The CRZ will be located upwind from the work activities. It will only be large enough to contain equipment and personnel necessary to keep potentially impacted media and materials in the immediate work area. This area will be designated with yellow flags attached to portable



SECTIONEIGHT

Site Control

stakes or cones. The CRZ will be established on the day site work commences within a particular exclusion zone, based on the direction of the wind on that day.

8.2.3 **Support Zone**

The remainder of the Sauget Area 2 Sites are defined as the support zone. The support zone contains support facilities, extra equipment, transport vehicles, and additional personnel and equipment necessary to manage and perform work activities.

8.3. SITE ACCESS PROCEDURES

URS personnel, subcontractors and regulatory personnel will sign in and out of Sauget Area 2 Sites every day at the field trailer. URS personnel leaving an exclusion zone will be decontaminated in a contamination reduction zone before entering the support zone.

SITE COMMUNICATIONS 8.4.

Portable communications, e.g., radios, cellular phones, etc. will be used during activities to facilitate communications for emergency response and other purposes and to serve as the primary off-site communication network. Telephones located at the Sauget Area 2 site trailer will provide back-up for the portable phones.

CONFINED SPACE ENTRY 8.5.

Entry of permit-required confined spaces will not occur during this project.



SECTIONNINE

Sauget Area 2 Sites Group

Decontamination

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9.1 PERSONNEL DECONTAMINATION PROCEDURES

Sampling activities will occur in widely separated locations. For this reason, equipment and personnel decontamination will be done at each sampling area, using temporary facilities. The SSO will be responsible for supervising the proper use and decontamination of equipment and PPE.

Decontamination involves scrubbing with a soap and water solution followed by rinses with potable water. Decontamination will take place on a decontamination pad. Dirt, oil, grease, or other foreign materials that are visible will be removed from surfaces. Scrubbing with a brush may be required to remove materials that adhere to the surfaces. Splash protection garments will be washed with soap and potable water before removal. Non-disposable garments will be airdried before storage. Wastewaters from personnel decontamination will be disposed of with the wastewaters from equipment decontamination. Respirators will be sanitized as well as decontaminated each day before re-use. The manufacturer's instructions will be followed to sanitize the respirator masks.

The following decontamination protocol, or one providing the same level of decontamination, will be followed:

Station 1: Equipment Drop 9.1.1

Provide a table covered with a plastic drop cloth. Deposit equipment used on site, including tools, sampling devices and containers, monitoring instruments, radios, and clipboards, on the table.

9.1.2 Station 2: Outer Garment, Boots, and Gloves Wash And Rinse

Establish a wash station for gloves, boots, and the protective suit (when worn). Scrub outer boots, outer gloves, and protective suit with detergent and water. Rinse with potable water.

Station 3a: Outer Boot and Glove Removal 9.1.3

Provide seating for use during the removal and collection of outer boots. Remove outer boots. Deposit them in a container with a plastic liner. If the boots are to be reused after cleaning, place them in a secure location near the work site. Provide a location for removal, collection, and disposal of outer gloves. Remove the outer gloves. Deposit them in a container for disposal.



SECTIONNINE

Decontamination

During hot weather, a cool-down station with chairs, fans, and replenishing beverages may be setup in this area.

9.1.4 Station 3b: Filter or Cartridge Exchange

This station will be established only if respirators are worn. The workers' respirator cartridges and filters can be exchanged, new outer gloves and outer boots donned, and joints taped at this' station. From here the worker can return to work duties in the exclusion zone.

9.1.5 Station 4: Outer Garment Removal

This station will only be provided if a protective outer garment is worn. Provide a bench to sit on during the removal of the protective garment. If the garment is disposable, deposit it in a container with a plastic liner; otherwise, hang it up to air dry.

Station 5: Respirator Removal 9.1.6

This station will be established only if respirators are worn. Remove the respirator. Avoid touching the face with gloved fingers. Deposit the respirator on a plastic sheet.

9.1.7 Station 6: Inner Glove Removal

Remove and dispose of inner gloves. Deposit them in a container with a plastic liner. If the gloves are to reused, place them in a secure location near the work site, preferably in a plastic container.

Station 7: Field Wash 9.1.8

Provide a place for a field wash. Wash hands and face thoroughly. Shower if contamination is suspected.

9.2 **EQUIPMENT DECONTAMINATION PROCEDURES**

The PID, RAM and CGM used for health monitoring purposes will be cleaned of visible contamination and debris before initial use on-site, between uses, and after final use. Monitoring equipment that contacts impacted media will be decontaminated after each use by a lowphosphate detergent brushing followed by a clean water rinse. After decontamination, monitoring equipment will be stored separately from PPE.



SECTIONNINE

Decontamination

All drilling equipment will be decontaminated prior to commencing field activities, between sample locations, and prior to demobilizing from the site.

Decontaminated or clean equipment not in use will be covered with plastic and stored in a designated storage area in the support zone.

9.3 **DECONTAMINATION SUPPLIES**

The following supplies will be available on-site as needed for the decontamination of personnel and equipment:

- Plastic drop cloths
- DOT-approved fiberboard drums to collect non-reusable protective clothing
- Plastic wash tubs
- Soft bristled long-handle brushes
- DOT-approved drums in which to collect wash and rinse water
- Hand spray units for decontamination
- Soap, water, alcohol wipes, and towels to wash hands, faces, and respirators
- Washable tables and benches or chairs.

9.4 COLLECTION AND DISPOSITION OF IMPACTED MATERIALS AND REFUSE

Cuttings, purge waters, and field decontamination wastes will be collected at the point of generation and stored in temporary containers. PPE, solids, and liquids will be consolidated in separate bulk containers at a central area designated by SA2SG.



SECTIONTEN

Emergency Response

10.1 NOTIFICATION OF SITE EMERGENCIES

In an emergency, site personnel will signal distress either verbally or with three blasts from a horn (vehicle horn, air horn, and so forth). The SSO/Field Leader or the Project Manager will immediately be notified of the nature and extent of the emergency. Table 2 contains emergency telephone numbers. This table will be kept with the portable telephone and updated as needed by the SSO. The portable telephone will be used to notify off-site personnel of emergencies. The operating condition of this telephone will be verified daily before initiation of activities.

A map showing the location and the route to St. Mary's Hospital is included Figure 3. Directions to St. Mary's Hospital from the site are as follows:

From the Sauget Area 2 Sites, drive west on Monsanto Avenue to Illinois State Route 3, North (IL 3 N). Drive north on IL 3 N. Take the 170 east/I 64 East/I 55 North exit toward Chicago/Indianapolis. Take the 4th St Exit toward Business District/East St. Louis. Merge onto south 4th Street, turn right onto east Broadway/IL 15. Turn left onto north 8th Street St. Mazy's Hospital is located at 129 North 8th Street. The distance from the site to the hospital is approximately three miles. The estimated driving time is seven minutes.

A copy of this HASP will be provided, through the community relations staff for this project, to St Mary's Hospital and to the Cahokia and Sauget Fire and Police departments by the SSO. Should someone be transported to a hospital or doctor other than at St. Mary's Hospital, a copy of this HASP should accompany him/her.

10.2 RESPONSIBILITIES

The SSO is responsible for responding to, or coordinating the response of off-site personnel to emergencies. In the event of an emergency, the SSO/Field Leader will direct notification and response, and arrange follow-up actions. Upon notification of an exposure incident, the SSO will call 911 and request that hospital, fire, and police emergency response personnel recommend medical diagnosis or treatment if necessary, and provide transportation to the hospital. The SSO/Field Leader will contact local, state, and federal government agencies, as appropriate.

Before the start of remedial action activities at the Sauget Area 2 Sites, the SSO will:



SECTIONTEN Emergency Response

- 1. Notify emergency contacts, and health care facilities of the potentially hazardous activities on-site as a result of the activities listed in the Field Sampling Plan.
- 2. Confirm that the following safety equipment is available: eyewash and safety shower station, first aid supplies, air horn, and fire extinguisher.
- 3. Have a working knowledge of the URS safety equipment.
- 4. Confirm that a map detailing the most direct route to St. Mary's Hospital (Figure 3) is prominently posted with the emergency telephone numbers (Table 2).
- 5. Confirm that employees who will respond to emergencies have been appropriately trained.
- 6. Collect and maintain a file of Material Safety Data Sheets (MSDS) for materials used at the site during the remedial action activities. The MSDS are provided in Appendix D.

Before work may resume following an emergency, used emergency equipment must be recharged, refilled, or replaced and government agencies must be notified as required.

The Project Manager, assisted by the SSO/Field Leader, must investigate the incident as soon as possible. The Project Manager will assess whether and to what extent exposure actually occurred, the cause of exposure, and the means to prevent similar incidents. The resulting report must be signed and dated by the Project Manager and Associate for Safety and Health.

10.3 **ACCIDENTS AND INJURIES**

In the event of an accident or injury, workers will immediately implement emergency isolation measures to assist those who have been injured or exposed and to protect others from hazards. Upon notification of an exposure incident, the SSO will contact emergency response personnel who can provide medical diagnosis and treatment. If necessary, immediate medical care will be provided by personnel trained in first aid procedures. Other on-site medical or first aid response to an injury or illness will be provided only by personnel competent in such matters.

10.4 SAFE REFUGE

Before commencing site activities, a place of refuge for URS workers will be identified by the SSO. In case of an emergency, personnel in the exclusion zone should evacuate the work area both for their own safety and to prevent hampering rescue efforts. Following an evacuation, the



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SECTIONTEN

Emergency Response

SSO will account for site personnel. If evacuation from the on-site refuge location is necessary, the project vehicles will be used to transport personnel to the place of refuge.

FIRE FIGHTING PROCEDURES 10.5

A fire extinguisher meeting the requirements of 29 CFR Part 1910 Subpart L, as a minimum, will be available in the support zone during on-site activities. This is intended to control small fires. When a fire cannot be controlled with the extinguisher, the exclusion zone will be evacuated, and the fire department will be contacted immediately. The SSO/Field Leader will decide when to contact the fire department.

10.6 **EMERGENCY EQUIPMENT**

The following equipment, selected based on potential site hazards, will be maintained in the support zone for safety and emergency response purposes:

- Fire extinguisher
- First aid kit
- Eye wash bottles.

10.7 **EMERGENCY SITE COMMUNICATIONS**

Hand and verbal signals will be used at the Sauget Area 2 Sites for emergency communications.

10.8 SECURITY AND CONTROL

Work zone security and control during emergencies, accidents, and incidents will be monitored by the SSO/Field Leader. The duties of the SSO/Field Leader include limiting access to the work zones to authorized personnel and overseeing emergency response activities.



SECTIONELEVEN

Special Precautions and Procedures

The activities listed in the Field Sampling Plan may expose personnel to both chemical and physical hazards. The hazards associated with specific site activities are discussed in Section 2. The potential for exposure to hazardous situations will be significantly reduced through the use of air monitoring, PPE, hazard awareness, training, and administrative and engineering controls. Other general hazards that may be present on a hazardous waste work site are discussed below.

11.1 **HEAT STRESS**

The timing and location of this project may be such that heat stress could pose a threat to the health and safety of site personnel. The SSO will have a dry bulb thermometer on site and use it to implement work and rest regimens so that URS personnel do not suffer adverse effects from heat. These regimens will be developed by the SSO following the guidelines in Table 8-10 of the USEPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities which is attached in Appendix E. Special clothing and an appropriate diet and fluid intake will be recommended to URS personnel involved in the activities specified in Section 2 to further reduce this hazard. In addition, ice and fluids will be provided as appropriate in the support zone.

A detailed discussion is presented as SMS 18 in Appendix B.

11.2 HEAVY MACHINERY/EQUIPMENT

URS employees performing site activities may use or work near operating heavy equipment and machinery. Respiratory protection, hearing protection, and protective eyewear may be worn during portions of work activities. Since this protective equipment narrows the visual and acoustic environment of the wearer, URS personnel should exercise extreme caution in the vicinity of operating equipment and machinery to avoid physical injury to themselves or others.

A detailed discussion is presented as SMS 19 in Appendix B.

11.3 ADDITIONAL SAFETY PRACTICES

The following are important safety precautions that will be enforced during the completion of the activities listed in Section 2:

1. URS will not conduct operations during severe weather. The SSO/Field Leader will decide when severe weather conditions exist or are forecast and take actions appropriate



SECTIONELEVEN

Special Precautions and Procedures

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to the site and the anticipated severe weather to minimize the potential exposure of URS employees.

- 2. URS employees will refrain from unnecessary contact with plants, animals, and other biological hazards on the site. Should contact occur, the employee must report it to the SSO/Field Leader and the Corporate Associate for Safety and Health, following the procedures in Vol. 3 of the URS Quality Assurance Manual, Sections. 001 and 017.
- 3. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the exclusion zone and contamination reduction zones.
- 4. Hands and face must be thoroughly washed when leaving the support zone and before eating or drinking.
- 5. Contact with potentially impacted surfaces should be avoided whenever possible. Workers should minimize walking through puddles, mud, or other discolored surfaces; kneeling on ground; and leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground.
- 6. Medicine and alcohol can mask the effects of exposure to certain compounds. Consumption of prescribed drugs must be at the direction of a physician.
- 7. URS personnel and equipment in the work areas will be minimized consistent with effective site operations.
- 8. Unsafe or inoperable equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.
- 9. Activities in the exclusion zone will be conducted using the "Buddy System." The Buddy is another worker fully dressed in the appropriate PPE who can perform the following activities:
 - Provide partner with assistance
 - Observe partner for sign of chemical or heat exposure
 - Periodically check the integrity of partner's PPE
 - Notify others if emergency help is needed.



SECTIONELEVEN

Special Precautions and Procedures

10. The HASP will be reviewed frequently for its applicability to the current and upcoming operations and activities.

11.4 DAILY LOG CONTENTS

The Project Manager and the SSO will establish a system appropriate to the Sauget Area 2 Sites that will record, at a minimum, the following information:

- 1. URS personnel and other personnel conducting the site activities, their arrival and departure times, and their destination at the site
- 2. Incidents and unusual activities that occur on the site such as, but not limited to, accidents, breaches of security, injuries, equipment failures, and weather related problems
- 3. Changes to the Field Sampling Plan and the HASP
- 4. Daily information such as:
 - Work accomplished and the current site status
 - Air monitoring equipment calibrations, repairs, and results.
 - Site work zones.



SECTIONTWELVE

References

- American Conference of Governmental Industrial Hygienists 1998, 1998 TLV's® and BEIs,® Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices, Cincinnati, OH
- S Marlowe, Christopher CIII. Camp Dresser & McKee, May 1994. "Action Levels for Hazardous Waste Site Work." NIOSH, OSHA, USCG, EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, DHHS (NIOSH) Publication No. 85-115. October 1985
- O'Brien & Gere Engineers, Inc. 1999. Field Sampling Plan, Sauget Area 1 Support Sampling Project, Sauget and Cahokia, Illinois, Volume 2.
- O'Brien & Gere Engineers, Inc. 1999. Quality Assurance Project Plan, Sauget Area 1 Support Sampling Project, Sauget and Cahokia, Illinois, Volume 2.
- United States Environmental Protection Agency, Health and Safety Plan (HASP) Users Guide, Publication EPA 9285.8-0 1, July 1993
- United States Environmental Protection Agency, Standard Operating Safety Guides, Publication EPA 9285.1-03, June 1992
- 29 CFR. 19 10,120 Hazardous Waste Operations and Emergency Response
- 29 CFR 19 10.146 Permit-Required Confined Spaces



Health & Safety Plan Sauget Area 2 Sites Group Revision No.: 1

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Tables



TABLE 1 URS CORPORATION HAZARD ASSESSMENT SUMMARY

Project Name: Sauget Area 2 Site
Project Number: 23-20010024.02

Completed by: Brandi Higgings
Date: 02-Jan-01

Determine the applicability of these SMSs to your project	的知識YES 類	See SMS #
Emergency Action Plan		3
Housekeeping		21
New Employee Orientation		25
Sanitation	7	30
Regulatory Inspections	•	1
WILLIPROJECT/ACTIVITIES INVOLVE ANY OF THE FOLLOWING	YES III	SESSINS:#
Abrasive blasting or exposure to abrasive blasting media or waste		6
Accident investigation	1	See DHSM
Aerial lifts		7
Air contminants in hazardous concentrations	 	42/43
Asbestos surveys or abatement oversight	 	8
Bilogical hazards (snakes, poisonous plants, ect)	-	See DHSM
Bloodborne pathogens	 • • • • • • • • • • • • • • • • • • •	See DHSM
Boating	1	See DHSM
California job activities	 	5
Corrosive materials used or handled	1	9
Confined space entry	1	10
Computer use more than 4 hours per day for any employee	1	See DHSM
Caranes or hoists	 	38/11
Demolition activities of any type of structure		11
DOT Driver		See DHSM
Drilling	+	See DHSM
Electrical equipment (generators, live electrical conduits)	· · · ·	12
Excavations or exposure to excavation hazards	· ·	13
Flammable or combustible materials used or stored which could constitute a fire hazard	+	14/15
Hand tool use (portable, gas powered, electric, powder actuated)	+	16
Hazardous materials shipping		See DHSM
Hazardous substances - physical, chemical or health hazards	+	2
Hazardous waste activities (investigative or remedial)	 	17
Heat stress potential to employees working in hot environments or clothing		18
Heavy equipment in use at this project site	+	19
Hot work (welding, cutting, grinding)	 	20
Laboratory (wet lab work in the field)	+	47
Industrial site access of any kind		4
Lead exposures (lead paint removal, lead in dust, ect)	+	22
Lockout/tagout to control exposure to hazardous energy	+	23
Manbasket (crane suspended personnel platforms) for working at heights		37/38/41
Medical surveillance requirements	+	24
Noise exposure		26
Portable ladder use		28
Personal protective equipment	· ·	29
Respirator protection use - required and/or voluntary	+	42/43
Scaffolding		31
Subcontractors	+	46
Traffic control due to work in streets and/or roadways	+	32
Travile to remote locations and/or developing countries	 	36
Utility clearances - overhead or underground	+	34
Unexploded ordnance/chemical warfare agents present or potential	 	39
Underground storage tank investigation, removal, ect.		
	+	27
		1 41
Water, work over or around Work at altitudes greater than 7,000 feet	 	35

Notes:

DHSM - Division Health and Safety Manager

TABLE 2 EMERGENCY RESPONSE CONTACTS

Effective Date:	Expiration Date:
External Emergency Telephone Numbers	Telephone Numbers
Sauget Fire Department	911 or 618/332-6700
Cahokia Fire Department	618/337-5080
Sauget Police Department	
Cahokia Police Department	618/337-9505
St. Claire County Sheriff	911 or 618/277-3500
Illinois State Police	
St. Marys Hospital (East St. Louis, IL)	618/274-1900
Ambulance Service	911
Poison Control Center	800/942-5969
National Response Center Washington, D.C	800/424-8802
URS Telephone Numbers Robert B. Veenstra Project Officer	` ,
Robert B. Billman Project Manager	
Carla DodsAssociate for Safety and Health	
Phil JonesURS Corporate Health & Safety Director	
Mike DeBettencourt	719/444-8720
Facility Telephone Numbers	
Bruce Yare	
Solutia Inc.:	314/674-6370(office)

TABLE 3 **Known Soil Contaminants** Sauget Area 2 URS Project No. 23-20010024.02

Constituents	Site O	Site P	Site Q	Site R	Site S
VOCs					
,1,1-Trichloroethane	1,410	NA NA	NA NA	NR	12,000
enzene	30,769	NA NA	_NA	NR	NA
-Methyl-2-Pentanone	7,692	NA	250,000	NR	93,000
oluene	29,487	413	2,400,000	NR	990,000
hlorobenzene	58,974	NA	100,000	NR	NA
thylbenzene	166,667	NA	790,000	NR	450,000
otal Xylenes	615,385	450	NA NA	NR	620,000
,4-Dichlorobenzene*	NA NA	NA NA	1,200,000	NR	NA
Bis(2-Ethylhexyl)Phthalate*	NA	NA NA	1,100,000	NR	NA NA
Di-n-Butyl Phthalate*	NA	NA NA	900,000	NR NR	NA NA
>-Xylene	NA .	NA NA	2,300,000	NR	NA
SVOCs					
,4-Dichlorobenzene*	1,030,000	8,875	NA I	NR	NA NA
2-Dichlorobenzene	606,000	3.625	NA NA	NR	NA NA
.2.4-Trichlorophenol	26,923	NA	NA NA	NR	NA NA
vaphthalene	34,615	NA NA	NA NA	NR	200,000
-Methylnaphthalene	160,256	NA ·	NA NA	NR	NA
-Nitrosodiphenylamine	50,000	NA NA	NA NA	NR	NA
Pentachlorophenol	1,620,000	NA NA	NA NA	NR	NA NA
henanthrene	230,000	NA NA	NA NA	NR	NA NA
luoranthene	74,000	NA NA	NA NA	NR NR	NA NA
rene	282,051	NA	NA NA	NR	NA
Butyl Benzyl Phthalate	3,846,154	NA	NA	NR	490,000
Benzo(a)anthracene	121,795	NA NA	NA .	NR	NA
1,2,4-Trichlorobenzene	0.0653	NA NA	NA NA	NR	NA NA
Chrysene	282,051	NA NA	NA NA	NR	NA
Phenol	NA NA	3,875	NA	NR	NA NA
Di-n-Butyl Phthalate*	NA NA	16,250	NA NA	NR	1,500,000
Bis(2-Ethylhexyl)Phthalate*	NA .	NA NA	NA	NR	20,000,000
Di-n-Octyl Phthalate	NA NA	NA NA	NA NA	NR	310,000
PCBs					
Aroclor 1232	30,366	NA NA	NA NA	NR	NA
Aroclor 1242	1,871,795	NA NA	NA NA	NR	NA
Aroclor 1254	NA	NA NA	360,000	NR	69,000
Aroclor 1248	NA NA	NA	70,000	NR	85,000
Aroclor 1260	NA	NA	16,000,000	NR	41,000
Dioxins					
Tetrachlorodibenzo-p-Dioxin	170 ng/g	NA NA	3.31	NR	NA NA
Heavy Metals		<u> </u>			
Cadmium	0.031	NA.	0,152	NR	l NA
Copper	0.341	NA NA	1.63	NR	0.139
Mercury	0.0063	0.0039	0.0049	NR NR	0.0035
Nickel	0.136	NA NA	0.371	NR	NA NA
Zinc	1.398	NA NA	9.52	NR	0.327
Lead	NA NA	0.526	195	NR	392
Cyanide	NA NA	0.015	NA NA	NR	NA NA
Antimony	NA NA	NA NA	17.9	NR	NA NA
Arsenic	NA NA	NA	216	NR	NA NA
Chromium	NA NA	NA NA	3.65	NR	NA
Selenium	NA NA	NA	0.0599	NR	NA
Silver	NA NA	NA	0.0302	NR	NA
Thallium	NA NA	NA NA	0.00089	NR	NA NA
Aluminum	NA NA	NA NA	NA NA	NR	NA
Iron	NA NA	NA	NA NA	NR	NA
Magnesium	NA NA	NA NA	NA NA	NR	NA
Pesticides	NA NA	NA NA	NA I	NR	NA NA

Units - Parts Per Billion (ppb)

NA - Not analyzed by laboratory
NR - Specific constituent concentrations were not reported in the Administrative Order by Consent (AOC).

* - 1,4-Dichlorobenzene, Di-n-Butyl Phthalate, and Bis(2-Ethylhexyl)Phthalate are target analytes for both VOC (8260) and SVOC (8270), therefore they are reported as both and the concentrations provided are reported with the analysis in which they were detected.

TABLE 4 Known Groundwater Contaminants Sauget Area 2 URS Project No. 23-20010024.02

Constituents	Site O	Site P	Site Q	Site R	Site S
VOCs					
Methylene Chloride	52,000	NA	NA	NR	NA
Trans-1,2-Dichloroethene	14,000	NA	NA	NR	NA
2-Butanone	62,000	NA	NA NA	NR	NA
Trichloroethene	83,000	NA	NA	NR	NA
Benzene	190,000	NA	2,000	NR	NA
4-Methyl-2-Pentanone	38,000	NA	2,700	NR	NA
Tetrachloroethene	10,000	NA	NA .	NR	NA
1,1,2,2-Tetrachloroethane	12,000	NA	NA	NR	NA
Toluene	15,000	NA	1,600	NR	NA
Chlorobenzene	180,000	NA	6,700	NR	NA
1,2-Dichloroethane	NA	NA	3,000	NR	NA
2-Hexanone	NA	NA	3,500	NR	NA
SVOCs					
Phenol	1,100	NA	190,000	NR	NA
1,4-Dichlorobenzene	15,000	NA	NA	NR	NA
1,2-Dichlorobenzene	11,000	NA	NA	NR	NA
4-Methylphenol	1,100	NA	23,000	NR	NA
4-Chloroanaline	780	NA	15,000	NR	NA
2-Chlorophenol	NA	NA	33,000	NR	NA
2,4-Dimethylphenol	NA	NA	2,800	NR	NA
2,4-Dichlorophenol	NA	NA	14,000	NR	NA
2,4,6-Trichlorophenol	NA	NA	6,000	NR	NA
2-Nitroaniline	NA	NA _	2,000	NR	NA
Pentachlorophenol	NA	NA	35,000	NR	NA
Acenaphthylene	NA	NA	3,900	NR	NA
Heavy Metals					
Arsenic	133	NA	100	NR	NA
Cadmium	11	NA	NA	NR	NA
Lead	6,350	NA	NA	NR	NA
Cyanide	NA	NA	1,560	71	NA
Pesticides	NA	NA	NA	NR	NA
PCBs	NA NA	NA	NA NA	NR	NA
Dioxin/Furan	NA	NA	NA	NR	NA

Notes-

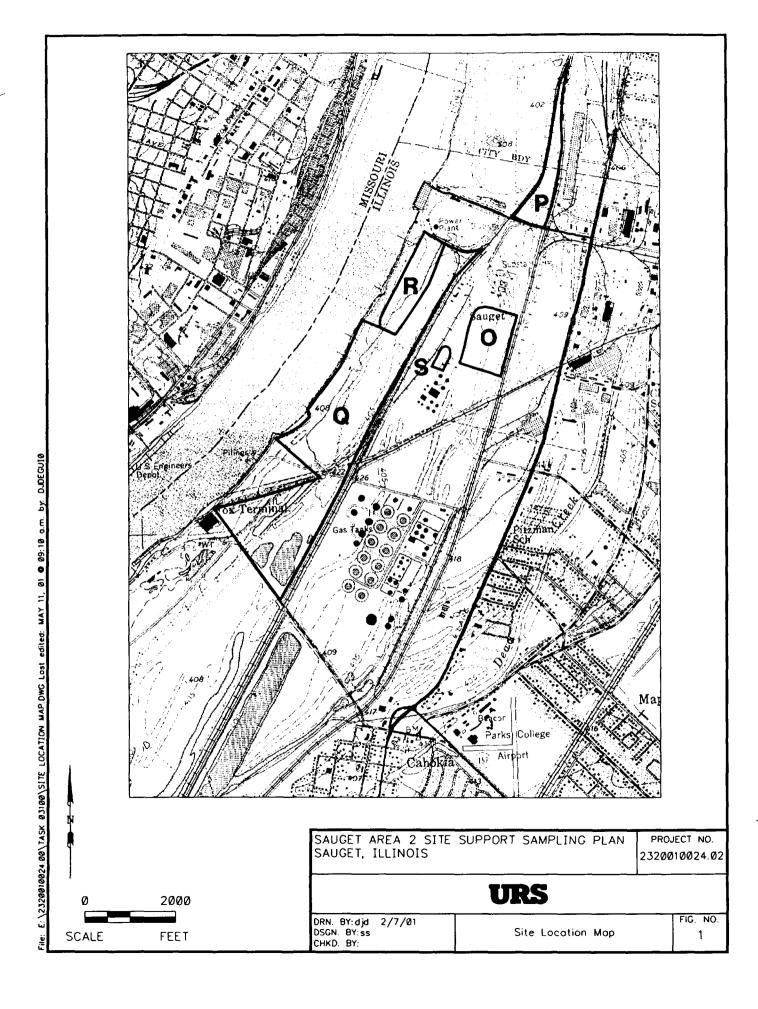
Units - Parts Per Billion (ppb)

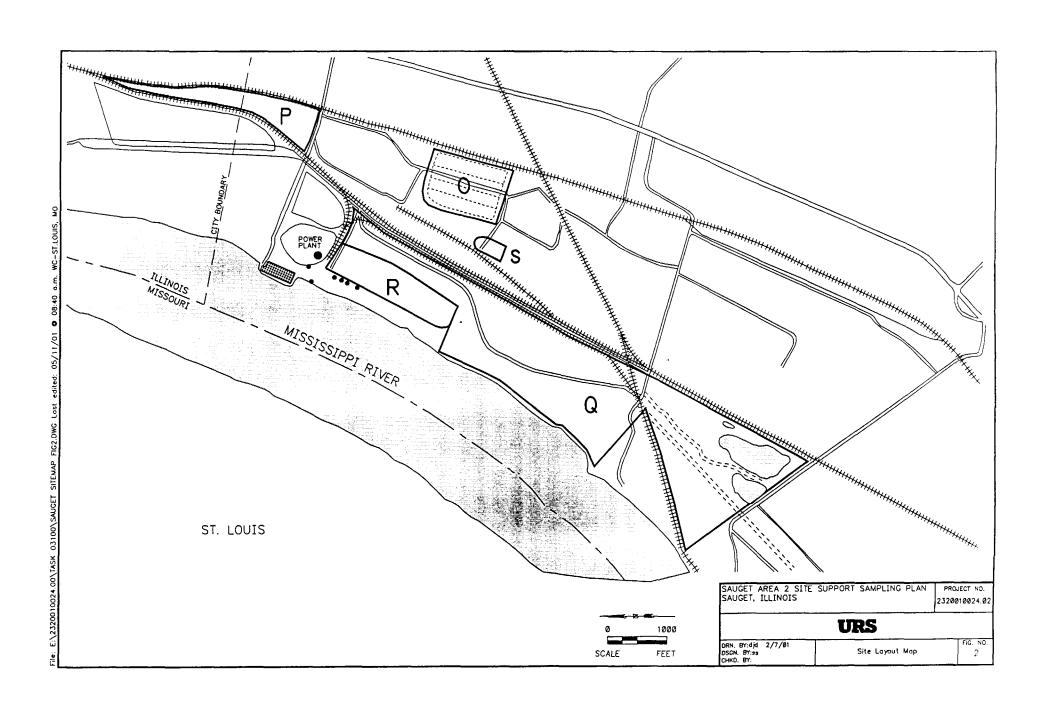
NA - Not analyzed by laboratory
NR - Specific constituent concentrations were not reported in the Administrative Order by Consent (AOC).

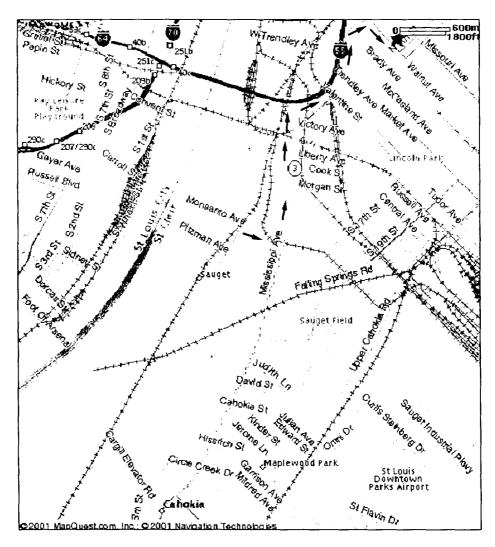
Health & Safety Plan Sauget Area 2 Sites Group **Revision No.: 1 Date: 05/25/01**

Figures









HOSPITAL LOCATION

SAUGET AREA 2 SITE SAUGET, ILLINOIS		PROJECT NO. 320010024.02
	URS	
DRN. BY:djd 2/7/01 DSCN. BY:sjs CHKD. BY:	Route to Hospital Map	FIG. NO.

024.00\1ASK 03100\FIG_3 HOSPITAL ROUTE.DWG Lost edited: MAY 10, 01 👁 1:45 p.m. by: DJDEGUIO

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APPENDIXA

Safety Forms

URS SAFETY BRIEFING AND COMPLIANCE AGREEMENT

Date/Time: _	nte/Time: Project Name:					
Site Location:		Project N	Project No.:			
Site Safety Off	icer:	Project Manag	er:			
Activity:		Subsite Nan	ne:			
	field work on the al		ety briefing was held for personnel The following topics were covered			
	Personnel assignm Chemical hazards, Physical hazards, Biological hazards Hazard assessment Standard operating Levels of protection Air monitoring reconstantion in	g procedures, site procedure on and PPE quirements requirements and procedure ommunication systems	ions ons tions es/prohibitions			
agree to abide understand it is conducted in the	by its provisions and in the best interest	d to aid the Site Safety Offi of myself and my co-workessible. I affirm that my safe	and attended a safety briefing. I cer in its implementation. I ers to ensure that site operations are ety training and medical are current			
	lame ************************************	Signature	Company			
			!			

	Name),	Signature	Company

<u> </u>			
			

URS SAFETY MEETING FORM

Date/Time: Site Location:		Project Name:			
		Project No.:			
Site Safety Officer:		Project Mana	ger:		
Activity:		Subsite Name:			
In compliance with the Health following topic(s) was/were co		n/SHERP, a sa	fety meeting was held and the		
Name ****	√** NiyaYi Signa	nture	Company		
為於一下。 (2019年下旬中以前用於數理的數,了解於數數學數數					
	 				
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Date: 05/25/01

APPENDIXB

URS Safety Procedures

Drill Rig Safety

The drill rig operator has superior knowledge regarding, and is responsible for drill rig maintenance and safety. The following information, taken from the National Water Well Association's Manual of Safe Operating Procedures, provides general guidelines for safe practices onsite.

Movement of Drill Rigs

The following safety guidelines relate to off road movement of drill rigs:

- Before moving a drill rig, first walk the route of travel, inspecting for depressions, slumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a drill rig carrier before traveling, particularly on rough, uneven, or hilly ground.
- Discharge all passengers before moving a drill rig on rough or hilly terrain.
- Engage the front axle of 4x4 or 6x6 vehicles or carriers when traveling off the highway on a hilly terrain.
- Use caution when traveling on a hillside. Conservatively evaluate the hillside capability
 of drill rigs, because the addition of drilling tools may raise the center of mass. When
 possible, travel directly uphill or downhill.
- Attempt to cross obstacles such as small logs, small erosion channels or ditches squarely, not at an angle.
- When lateral or overhead clearance is close, use the assistance of someone on the ground as a guide.
- Underground utilities are as dangerous as overhead lines. Be aware and always suspect
 the existence of underground utilities such as electrical power, gas, petroleum, telephone,
 sewer, and water. Ask for assistance:
- If a sign warning of underground utilities is located on a site boundary. Do not assume that underground utilities are located on or near the boundary or property line under the sign; telephone the utility company and check it out. The underground utilities may be a considerable distance away from the warning sign.
- Always contact the owners of the utility lines or the nearest underground utility location service before drilling. The utility personnel should determine the location of underground lines and should mark and flag these locations. Determine, with the utility personnel, what specific precautions must be taken to assure safety.

Housekeeping On and Around The Drill Rig

To complete the first requirement for safe field operations, the safety supervisor of the drilling crew must understand and fulfill his responsibility for maintenance and "housekeeping" on and around the drill rig. Suitable storage locations should be provided for all tools, materials, and supplies. The locations should allow for the convenient handling of tools, materials or supplies without danger that these could fall on or hit a member of the drill crew or a visitor.

Avoid storing or transporting tools, materials, or supplies within or on the mast (derrick) of the drill rig. Pipe, drill rods, bits, casing, augers, and similar drilling tools should be stacked in an orderly manner on racks or sills to prevent spreading, rolling, or sliding.

Penetration hammers or other types of driving hammers should be placed at a safe location on the ground or secured to prevent movement when not in use. Work areas, platforms, walkways, scaffolding, and other access ways should be kept free of materials, obstructions, and substances such as ice, excess grease, or oil that could cause a surface to become slick or otherwise hazardous. Keep all controls, control linkages, and warning and operation lights and lenses free of oil, grease, and/or ice.

Do not store gasoline in any portable container other than a non-sparking, red safety can with a flame arrestor in the fill spout. The word "gasoline" must be clearly visible on the container.

Use of Hand Tools

There are many kinds of hand tools that can be used on or around a drill rig. The most important rule is "use the tool for its intended purpose." The following are a few specific and general suggestions that apply to the safe use of several hand tools often used on and around drill rigs.

- When a tool becomes damaged, either repair it before using it again or discard it.
- When using a hammer, any kind of hammer, for any purpose, wear safety glasses and require all others around you to do the same.
- When using a chisel, any kind of chisel, for any purpose, wear safety glasses and require all others around you to do the same.
- Keep all tools cleaned and stored in an orderly manner when not in use.
- Replace hook and heel jaws when they become visibly worn.
- When breaking tool joints on the ground or on a drilling platform, position your hands so that your fingers will not be caught between the wrench handle and the ground or the platform, should the wrench slip or the joint suddenly let go.

Use of Augers

The following general procedures should be used when advancing a boring with continuous flight or hollow-stem augers:

- Prepare to start an auger boring with the drill rig level, the clutch or hydraulic rotation control disengaged, the transmission in low gear, and the engine running at a low RPM.
- The operator and tool handler should establish a system of responsibility for the series of various activities required for auger drilling, such as connecting and disconnecting auger sections, and inserting and removing the auger fork. The operator must be sure that the tool handler is well away from the auger column and that the auger fork has been removed before starting rotation.
- Only use the manufacturer's recommended method of securing the auger to the power coupling. Do not touch the coupling or the auger with your hands, a wrench, or any other tool during rotation.
- Whenever possible, use tool hoists to handle auger sections.
- Never place your hands or fingers under the bottom of an auger section when hoisting the
 auger over the top of the auger section in the ground or other hard surfaces such as the
 drill rig platform.
- Never allow your feet to get under the auger section that is being hoisted.
- When rotating augers, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
- Never use your hands or feet to remove cuttings away from auger.
- Augers should be cleaned only when the drill rig is in neutral, and the augers have stopped rotating.

Start-Up Procedures

All drill rig personnel and visitors should be instructed to "stand clear" of the drill rig immediately prior to and during and starting of an engine. Before starting a drill rig engine, make sure that all of the gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the correct non-actuating positions, and the cathead rope is not on the cathead.

Drill Rig Operation

Safety requires the attention and cooperation of every worker and site visitor. The following procedures are related to safety during drilling operations:

• Do not drive the drill rig from hole to hole with the mast in the raised position. Before raising the mast, look up to check for overhead obstructions.

- Before raising the mast, clear all drill rig personnel (with the exception of the operator)
 and visitors from the areas immediately to the rear and the sides of the mast. In addition,
 inform them that the mast is being raised.
- Before the mast of a drill rig is raised and drilling is commenced, the drill rig must first
 be leveled and stabilized with leveling jacks and/or solid cribbing. The drill rig should be
 re-leveled if it settles after the initial set up. Lower the mast only when leveling jacks are
 down, and do not raise the leveling jack pads until the mast is completely lowered.
 Before starting drilling operations, secure and/or lock the mast, if required by the drill
 manufacturer's recommendations.
- The drill rig operator should operate a drill rig only from the position of the controls. The operator should shut down the drill engine before leaving the vicinity of the drill. "Horsing around" within the vicinity of the drill rig and tool and supply storage areas is strictly prohibited, even when the drill rig is shut down. Watch for slippery ground when mounting/dismounting the platform.
- Drilling operations should be terminated during an electrical storm.
- Consuming alcoholic beverages, depressants, stimulants, or any other chemical substance while on the job is strictly prohibited.

All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors or animals from stepping or falling into the hole. When the drilling project has been completed, all open boreholes should be covered, protected or backfilled adequately and according to local or state regulations.

D&MG SAFETY MANAGEMENT STANDARD REGULATORY INSPECTIONS

1.0 Applicability

This program applies to D&MG office and field operations.

2.0 Purpose and Scope

Representatives of regulatory agencies may have statutory authority to evaluate D&MG operations for compliance with health and safety regulations. D&MG personnel are to cooperate with all such inspections. This procedure provides guidelines for responding to the inspector and for documenting inspection activities.

3.0 Implementation

Office Locations - Implementation of this procedure is the responsibility of the Location Manager.

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

A. Obtaining Positive Identification

Request formal identification (photo identification card) from any regulatory agency representative. Call the agency if there is any question regarding the identity of the individual (independently obtain the agency's number; don't use a number provided by the representative). Obtain a business card from the inspector for D&MG records.

B. Warrants

Do not require an inspector to obtain a warrant prior to conducting an inspection.

C. Health and Safety Notification

Contact the local D&MG Health and Safety Representative or D&MG Health and Safety Manager immediately upon confirming the identification of the representative.

D. Opening Conference

- 1. Request an opening conference if one is not initiated by the inspector.
- 2. Use the opening conference to determine why the inspector is conducting the inspection.
- 3. Take good notes during the conference.

E. Inspection Activities

- Escort the inspector at all times, taking him/her directly to the area of interest.
- 2. Answer all questions honestly, but do not volunteer information.
- 3. Do not argue with or attempt to mislead the inspector.
- 4. Resolve violative conditions immediately, while the representative is on site, if possible.
- 5. Make sure the inspector has appropriate qualifications to enter high hazard areas.
- 6. Take good notes during the inspection and take pictures where the inspector takes pictures.
- 7. Inspectors generally have the right to interview employees if they do not interrupt operations.

F. Closing Conference

- 1. Request a closing conference if one is not initiated by the inspector.
- 2. Use the closing conference to determine what regulatory violations the representative found, if any.
- 3. Do not try to negotiate during the closing conference.
- 4. Take good notes during the conference.

G. Post-Inspection Activities

- Immediately contact D&MG Health and Safety Manager and communicate the results of the inspection. The D&MG Health and Safety Manager will provide additional instructions regarding the inspection.
- 2. Debrief any employees who were contacted by the representative; all discussions should be reduced to notes.
- All follow-on activities associated with the inspection will be coordinated by the Group Health and Safety Manager and appropriate legal counsel. Local D&MG employees are not to conduct any follow-on activities without the express consent of the D&MG Health and Safety Representative.

5.0 Documentation Summary

Provide the following documents to the D&MG Health and Safety Manager

- A. Inspector's business card
- B. All materials provided by the inspector
- All notes relating to the inspection, opening conference, closing conference, and debriefings
- D. All photos from the inspection, with explanatory notes

6.0 Resources

A. U.S. OSHA - Field Inspection Reference Manual (http://www.osha-slc.gov/Firm_osha_toc/Firm_toc_by_sect.html)

1. Applicability

This procedure applies to URS office and field operations.

2. Purpose and Scope

This procedure establishes policy, assigns responsibilities, and provides guidance to URS offices/field projects regarding emergency action. It includes general information on actions to be taken by URS management and employees in the event of a fire or other emergency that may endanger life or property.

The objectives of this procedure are to:

- A. Promote a fast, effective reaction in coping with emergencies.
- B. Save lives and avoid injuries and panic.
- C. Restore order and conditions back to normal levels with a minimum of confusion and as promptly as possible.

3. Implementation

Office Locations- Implementation of this program is the responsibility of the

Office Manager.

Field Activities- Implementation of this program is the responsibility of the

Project Manager.

4. Requirements

A. Emergency Action Plan Development

1. Gather Information

Each URS office/project must develop an emergency Action Plan tailored to its specific situation. Office Managers will check with their building manager or landlord regarding evacuation procedures they may have in place and incorporate these procedures into the emergency Action Plan. Project EAPs must comply with client requirements and specifications. The Plan must contain the following:

a. Reporting Fires and Other Emergencies

Describe the procedures that personnel should follow to report emergencies. List emergency telephone numbers for fire, paramedics and police. Include local prefixes on emergency numbers, if required, such as 9-911.

b. Alarm System

Describe the emergency alarm system for the building/site as applicable. Include the description and location of fire alarm pull boxes, and visual and audible alarms. If a public address (PA) system is used to notify occupants of emergencies, include the procedures to activate the PA system, such as calling the receptionist or building manager's office, and a description of the announcements that will be made.

c. Evacuation Routes and Procedures

Develop a map or description of the evacuation routes and emergency exits to be use. A description of the building emergency lighting system and exit signs may also be included. Evacuation route maps may be posted in the offices. There should be a primary and alternate evacuation route and exit from each work area.

Describe procedures regarding the use of elevators, if applicable. In most cases elevator use is prohibited during an emergency. The building manager should be consulted for these procedures.

Include procedures to determine that no employees have been inadvertently left behind.

d. Critical Equipment/Operations Procedures

Designate personnel responsible for shutting down critical equipment and the procedures for doing so, if applicable.

e. Assisting Disabled Personnel

Describe the provisions that have been made for notifying and assisting personnel with disabilities during an emergency. Such provisions are to accommodate personnel in wheelchairs or those who are temporarily disabled, such as personnel on crutches.

f. Personnel Accounting Procedures

Designate a primary and alternate assembly area for personnel who are evacuating. Require sufficient distance so that personnel will not be exposed to fire or debris hazards, or traffic, nor interfere with emergency responders.

Designate an individual and an alternate with the assigned responsibility for taking a headcount in the assembly area and reporting missing personnel to emergency responders.

Define the procedures on how employees will be informed that it is safe to re-enter the building or to leave for home.

g. Rescue and Medical Duties

Include the statement that "URS does not expect or encourage its employees to engage in firefighting, medical treatment, rescue, or other emergency response. Such activities should only be performed by properly equipped and trained emergency responders. URS recognizes that some of its personnel may have received training in first aid and cardiopulmonary resuscitation (CPR) and may wish to perform these duties on injured personnel."

B. Posting

- 1. Post the Emergency Action Plan where it is available to all employees.
- 2. Post evacuation maps at all exits and points of egress.

C. Training

Train all employees regarding the requirements of the Emergency Action Plan.

5. Documentation Summary

A. Office

File these records in the Office Safety Filing System:

1. Emergency Action Plan

- 2. Evacuation Maps
- 3. Training records
- B. Field

File these records in the Project Safety File.

- 1. Emergency Action Plan
- 2. Evacuation Maps
- 3. Training records

6. References

- A. U.S. OSHA Standard Emergency Action Plans 29 CFR 1910.38
- B. U.S. OSHA Fact Sheet Responding to Workplace Emergencies

URS SAFETY MANAGEMENT STANDARD Accessing Industrial Sites

1. Applicability

This procedure applies to projects where URS personnel access industrial sites.

2. Purpose and Scope

The purpose of this procedure is to require that personnel determine the appropriate personal protective equipment, and receive hazard, safety and emergency information when accessing industrial sites.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

- A. Prior to accessing the site contact the facility to determine:
 - 1. PPE requirements for personnel SMS 29.
 - 2. The procedure for safely accessing the site.
 - 3. The need for training and/or orientation upon arrival including MSDS.
 - 4. Any other safety procedures specifically required at the site that would require advance planning or coordination.
 - 5. Security requirements.

B. Upon accessing the site:

- 1. Report to the designated entry location.
- 2. Attend required safety orientation/briefings.
- 3. Prepare to comply with site rules.
- 4. Inquire as to the following issues if not addressed:
 - a. Facility emergency procedures including alarms and evacuation procedures.
 - b. How to activate emergency procedures if necessary.

URS SAFETY MANAGEMENT STANDARD Accessing Industrial Sites

- c. Information regarding potential chemical exposures:
 - 1. MSDS access SMS 2.
 - 2. Where these potential exposures exist.
 - 3. Controls in place to prevent exposures.
 - 4. How to identify when exposures may occur.
- d. Safety hazards which may not be inherently obvious and site rules or procedures regarding those hazards.
- e. Traffic issues within the facility including:
 - 1. Lift truck and material handling vehicles.
 - 2. Establishment of Right of Way.
 - 3. Vehicle access to site.
 - 4. Special pedestrian rules.
- f. Major program coordination issues, such as:
 - 1. Confined Space Entry Procedures SMS 10.
 - 2. Lockout/Tagout and Control of Hazardous Energy Procedures SMS 23.
 - 3. Utility clearances SMS 34.
- C. Document site issues on Attachment 4-1.
- D. Enter the site prepared to comply with URS and site procedures. In the event that there is a discrepancy, coordinate with site representative and prepare to use the most protective procedure.
- E. Wherever significant safety issues remain that cannot be resolved locally, contact URS Health and Safety Program Representative for support in resolving such issues.
- 5. Documentation Summary

Field Operations

URS SAFETY MANAGEMENT STANDARD Accessing Industrial Sites

A. File <u>Attachment 4-1</u> "Accessing Industrial Sites" in the Project Health and Safety File.

6. Resources

- A. U.S. OSHA Standard Emergency Action Plans 29 CFR 1910.38
- B. U.S. OSHA Fact Sheet Responding to Workplace Emergencies
- C. Attachment 4-1 Assessment Form

URS SAFETY MANAGEMENT STANDARD Worker Right-to-Know (Hazard Communication)

1. Applicability

This procedure applies to URS office and field operations.

2. Purpose and Scope

The worker right-to-know program provides URS personnel with information and training about safety and health hazards associated with the chemicals they might encounter in the workplace. This procedure describes how chemical safety hazards are communicated to URS personnel working in offices and at field site locations, and how information is to be provided to employees of other employers working at the location. The requirements include steps to acquire this information, maintain it, and train everyone to use it.

3. Implementation

Office Locations: Implementation of this program is the responsibility of the

Office Manager.

Field Activities: Implementation of this program is the responsibility of the

Project Manager.

4. Requirements

A. Hazardous Material Inventory

- Maintain a hazardous material inventory that lists all of the hazardous materials used at this workplace. Use chemical names consistent with the applicable MSDS's.
- 2. File a copy of the chemical inventory in the Safety Filing System.

B. Material Safety Data Sheets (MSDS's)

- 1. Obtain a MSDS for each chemical before it is used.
- Review each MSDS when it is received to evaluate whether the information is complete and to determine if existing protective measures are adequate.
- 3. Maintain a collection of all MSDS's where they are accessible at all times.

URS SAFETY MANAGEMENT STANDARD Worker Right-to-Know (Hazard Communication)

- Replace MSDS sheets when updated sheets are received.
 Communicate any significant changes to those who work with the chemical.
- 5. MSDS's are required for all hazardous materials used on site by project personnel.

C. Labels

Label all chemical containers with:

- 1. Identity of the hazardous chemical(s),
- 2. Appropriate hazard warnings, and
- 3. Name and address of the chemical manufacturer, importer, or other responsible party.

D. Hazardous Nonroutine Tasks

Periodically, employees are required to perform hazardous non-routine tasks. Prior to starting work on such projects, provide each employee with information about hazards to which they may be exposed during such an activity.

This information will include:

- 1. Specific chemical hazards.
- 2. Protective/safety measures which must be utilized.
- Measures that have been taken to lessen the hazards including ventilation, respirators, presence of another employee and emergency procedures.

E. Informing Contractors/Subcontractors

Provide contractors/subcontractors the following information on chemicals used by or provided to URS personnel:

- 1. Names of hazardous chemicals to which they may be exposed while on the jobsite.
- 2. Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures.

URS SAFETY MANAGEMENT STANDARD Worker Right-to-Know (Hazard Communication)

3. Location of URS MSDS's and written chemical inventory.

F. Training

- 1. Conduct training of all employees potentially exposed to hazardous materials on the following schedule:
 - a. Before new employees begin their jobs.
 - Whenever new chemicals are introduced into the workplace, or
 - c. Annually thereafter.
- 2. This training will include:
 - a. Applicable regulatory requirements.
 - b. Names of those responsible for implementing this program.
 - c. Location of the program, inventory and MSDS 's.
 - d. Chemicals used, and their hazards (chemical, physical and health).
 - e. How to detect the presence or release of chemicals.
 - f. Safe work practices.
 - g. How to read an MSDS.
- 3. Document the training.

5. Documentation Summary

- A. File these records in the Office Safety Filing System
 - 1. Chemical Inventory.
 - 2. Location of the MSDS inventory.
 - 3. Training records.
 - 4. Contractor/Subcontractor notifications.
- B. File these records in the Project Safety File.

URS SAFETY MANAGEMENT STANDARD Worker Right-to-Know (Hazard Communication)

- 1. Chemical Inventory.
- 2. Location of the MSDS inventory.
- 3. Training records.
- 4. Contractor/Subcontractor notifications.

6. Resources

- A. U.S. OSHA Technical Links Hazard Communication (http://www.osha-slc.gov/SLTC/hazardcommunications/index.html)
- B. U.K. Control of Substance Hazardous to Health Regulations

URS

Health and Safety Program

Attachment 4-1

HEALTH AND SAFETY ASSESSMENT

Industrial Site				
Project Manager Date			·	
		Yes	No	N/A
PRE JOB SURVEY				
Are there PPE requirements for site access?				
If yes, describe the requirements.		ĺ	ļ	
·		Ì		
		İ		
		1	ł	Ì
What are the procedures for safely accessing the site?				
			ļ	1
			1	
		Ì	<u> </u>	1
le there a consistement for estatation of a refet, briefing upon prival?		 -	 	
Is there a requirement for orientation or a safety briefing upon arrival? Are there any other safety procedures specific to this site that require		ļ ———		
advance planning?			į	{
If yes, describe the requirements			1	
			}	
		}		
UPON ACCESING THE SITE		<u> </u>	<u>.</u>	<u> </u>
Have facility emergency procedures been discussed?				
Alarms				
Evacuation Routes				
Procedures to activate emergency system				
Has the worker Right to Know program for the site been addressed (Hazcom/WHMIS)?				
Site chemical hazards shared with URS staff?				
 Information provided to owner regarding chemicals brought to sit URS? 	e by			
Are all parties aware of how to detect exposures to chemicals?				
 Have control measures regarding potential chemical exposures t discussed between parties? 	been			
Are there any safety hazards on the site which are not inherently obvious	us?			1



Health and Safety Program

Attachment 4-1

HEALTH AND SAFETY ASSESSMENT

		Yes	No	N/A
If yes, describe hazards and site protective measures.				
				}
				
Are there any special traffic rules for the site?				
Lift truck or material handling vehicles onsite?	•			
Right of way issues?				
If yes, describe.				
		ł		
Are there any special rules for contractor vehicles on site?		 		
Are there any special pedestrian rules?				
If yes, describe				
		1		
				ļ
Are there any major program coordination issues at this site?		ļ. <u>. </u>		
Confined Space Entry				
Lockout/Tagout		·		
Process safety line brake issues		ļ		
If yes, describe.				
			ł	}
			:	
Have all of the above-related issues been shared with all project-related	nted			
personnel and subcontractors?				
If no, why not?	-			
	·	<u> </u>	L	I
Project Manager	Date			
	_			
Site Manager	Date			

D&MG SAFETY MANAGEMENT STANDARD CALIFORNIA INJURY AND ILLNESS PREVENTION PROGRAM

1.0 Applicability

This standard applies to all D&MG office and field operations in California. Each D&MG Division operating in California is responsible for implementing this program in its operations.

2.0 Purpose and Scope

The purpose of the Injury and Illness Prevention Program (IIPP) is to minimize the incidence of workplace injuries and illnesses. This standard complies with California Code of Regulations Title 8, Sections 1509 and 3203.

3.0 Implementation

Office Locations - Implementation of this procedure is the responsibility of the Location Manager.

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

Program Administration

Each D&MG Division shall select an IIP Program Administrator who shall be responsible for the overall maintenance and implementation of that Division's IIPP and report the name of the IIPP Administrator to the D&MG Health and Safety Manager.

4.0 Requirements

- A. Require that all employees comply with safe and healthful work practices
 - 1. Inform employees of the provisions of this program by requiring their attendance at IIPP training sessions.
 - 2. Evaluate the safety performance of employees on an ongoing basis, and formalize the observations during the annual performance evaluation.
 - a) Provide additional safety training to employees whose safety performance is deficient.

- b) Discipline those employees who fail to comply with D&MG Safety Management Standards in accordance with Human Resources guidelines.
- c) Recognize those employees whose safety performance is superior, documenting such recognition in the employee's personnel file.

B. Communication

- 1. Communicate with all employees about occupational safety and health in a manner that is readily understood by all employees.
 - a) Verify that all new employees complete New Employee Orientation within one week of starting work (see SMS 25, "New Employee Orientation").
 - b) Verify that all new employees complete IIPP training within one week of starting work.
 - c) Require that appropriate health and safety training courses are made available to employees timely (see SMS 46, "Health and Safety Classification").
 - d) See that employees have access to the D&MG Health and Safety Program and Management System on the D&MG Intranet.
 - e) Provide employees the opportunity to participate in the local health and safety committee.
 - f) Conduct regular field site safety briefings for all employees on a project (see SMS on Site Safety Briefings).
- 2. Encourage employees to provide feedback on workplace safety issues.
 - a) See that employees have unfettered access to the anonymous Safety Feedback Program.
 - b) Require that employees understand that no reprisals will result from the use of the Safety Feedback System.

C. Hazard Assessment

 Execute hazard assessments in accordance with the D&MG Project Hazard Assessment Process.

2. Conduct hazard assessments:

- a) When new substances, processes, procedures or equipment which present potential new hazards are introduced into the workplace. Contact a D&MG Health and Safety Program Representative if you are not certain that an assessment should be initiated.
- b) When new, previously unidentified hazards are recognized, either through an employee report or a workplace inspection.
- c) In conjunction with an incident investigation (see SMS on Accident Investigations).

D. Accident and Exposure Investigations

Conduct investigations of accidents, near-misses, or chemical exposures in accordance with the SMS on Accident Investigations.

E. Hazard Correction

- 1. Require that unsafe or unhealthy work conditions, practices or procedures are corrected in a timely manner based on the severity of the hazards.
- 2. Hazards discovered during a formal audit shall be abated in accordance with the time table provided in the audit report.
- 3. Correct imminent hazards either:
 - a) Immediately, or
 - b) If immediate correction cannot be accomplished without endangering employees and/or property, remove employees from the hazard area until the hazard can be safely abated.
- 4. Document hazard corrections to the project or office safety file.

F. Training and Instruction

 Provide health and safety training and instruction to all employees in accordance with the requirements of the SMS 46, "Health and Safety Classifications".

2. Provide training:

- a) To all new employees.
- b) To employees with new job assignments for which training has not been previously accomplished.
- c) Whenever new substances, processes, procedures or equipment are introduced to the workplace and may represent a new hazard not addressed by previous training.
- d) To supervisory employees to familiarize them with the safety and health hazards to which workers under their supervision may be exposed.

G. Program Evaluation

Evaluate the IIP Program for each location on an annual basis using the checklist in Attachment 5-1.

5.0 Documentation Summary

Maintain in the Office Safety File:

- 1. Employee training certificates.
- 2. Office hazard assessments and corrective actions.
- 3. A copy of this Program and associated documents (e.g., referenced SMSs).

Maintain in the Project Safety File:

- 1. Employee training certificates.
- 2. Project Hazard Assessment Process documentation.
- 3. Safe Work Plan or Health and Safety Plan.

6.0 Resources

A. Cal/OSHA Standard - Injury and Illness Prevention Program - 8 CCR 3203 (http://www.dir.ca.gov/title8/3203.html)



D&MG Health & Safety Program CALIFORNIA INJURY AND ILLNESS PREVENTION PROGRAM EVALUATION CHECKLIST

Locati	on:				
Date Evaluated: Name of Evaluator:					
	Note: All "NO" answers must be explained in the remarks section	Yes	No		
\$3°	Responsibility	38 S	THE TO		
1.	Does the IIP Program name the individual responsible for Program implementation?				
2.	Do personnel in a random sample know the name of the responsible individual?		 		
	Compliance		A STANK		
3.	Is there a system for ensuring that employees comply with safe and healthful work practices?	-			
4.	Are employees recognized for complying with the Program?				
5.	Are employees disciplined for failure to comply with the Program?				
6.	Are retraining programs available for those who fail to comply?				
7.	Provide documentation for all items in this section answered "yes."		1		
Colo	Character 19 11 Than the first 19 12 The American Control of the Application of the Control of the Control of the Control of the Application of th	A PO	A THE STATE OF		
8.	Is there a safety communication system active in the office? If yes, describe in "remarks," below.				
9.	Are employees encouraged to report worksite hazards without fear of reprisal?				
10.	Is a random sample of employees aware of safety communication systems?				
Jan .	Hazard/Assessment	2. 有种型			
11.	Are procedures available for identifying and evaluating workplace hazards? If yes, describe in "remarks," below.				
12.	Are hazard assessments performed and documented when a new process, substances, or equipment is brought into the workplace?				
13.	Are hazard assessments performed and documented when supervisors are advised of new or previously unrecognized hazards?	-			
123	Accident/Exposure Investigation				
14.	Is a procedure in place to timely investigate an occurrence of an occupational injury or illness and document the results of the investigation?				
15.	Do the investigations result in the determination of the cause(s) of the occupational injury or illness?				
77 (17) 1833	Hazard Correction	平高温性			
16.	Are specific hazard abatement methods documented in the IIP Program?				
17.	Do the methods discuss the handling of unsafe or unhealthful working conditions?				
18.	Do the methods require the removal of personnel from the hazard area when there are imminent hazards that cannot be immediately abated without endangering personnel?				

Locat	ion Inspected:	
\$72 (16) \$20 (16)	Training and Instruction 3.3.4	a j
19,	Is training appropriate to the job assignment provided to employees prior to them undertaking the assignment?	
20.	Is training provided to employees using new equipment, processes or substances?	Γ
21.	Is training provided to employees exposed to new or previously unrecognized hazard conditions?	
F 150	Recordkeeping	蒙
22.	Are records of training and periodic workplace inspections maintained for at least three years on site?	
Signa	ture of Location Manager: Date;	

D&MG SAFETY MANAGEMENT STANDARD ABRASIVE BLASTING

1.0 Applicability

This procedure applies to D&MG projects involving abrasive blasting activities.

2.0 Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with abrasive blasting activities.

3.0 Implementation

Field Locations – Implementation of this program is the responsibility of the Project Manager.

4.0 Requirements

- A. Identify those activities during the project that will utilize abrasive blasting.
- B. Investigate the composition of materials to be blasted.
 - 1. Look for asbestos, lead, various heavy metals, and other types of toxins in the substrate to be blasted.
 - Follow applicable D&MG SMS if any of the above metals or toxins are found in the substrate to be blasted.
- C. Select the abrasive blasting media to be used.
 - 1. If possible, abrasives other than silica should be used.
 - 2. Whenever possible, use wetblast injection equipment to reduce airborne dust on the job site.

- D. Select the blasting media recovery method to be used.
 - 1. Preferred recovery methods are:
 - a) Vacuuming with a machine equipped with a HEPA filter.
 - b) Wet shoveling.
 - 2. Dry sweeping is not to be used.
- E. Determine if any tarping or containment of the blast area is needed.
 - 1. Tarping or containment may be required in sensitive environmental areas or when working over water.
 - a) Provide properly engineered ventilation to reduce dust levels when containments are used.
- F. Establish a hazardous blasting zone.
 - 1. Eating, drinking, smoking should not be allowed in the hazardous blasting zone.
 - 2. Rest breaks should not be taken in the hazardous blasting zone.
 - 3. PPE should be worn by all who enter the hazardous blasting zone.
 - 4. Determine the type of PPE needed for personnel within the blasting zone.

At a minimum personnel performing abrasive blasting and cleaning activities will use:

- a) Type CE Abrasive-Blasting Supplied-Air respirator, helmet. Air must be from a good air source. See SMS 42, "Respiratory Protection".
- b) Disposable or washable coveralls that will not be taken home.
- c) Earplugs.
- d) Work gloves that protect the full forearm; heavy canvas or leather gloves and aprons.
- e) Safety shoes or boots with steel toes.
- G. Check for electrical power lines or any other immediate hazards that may injure blasters or support personnel during the job.
- H. Follow guidance in SMS 10, "Confined Space Entry" if blasting in a confined space.

- Require that personnel performing blasting and clean-up operations are medically qualified. Contact Division Medical Surveillance Administrator for detailed information on physical requirements.
- J. Require that personnel performing blasting and clean-up operations are trained and qualified.

Operators should:

- 1. Know how to operate the equipment safely and maintain equipment in top condition.
- 2. Know how to inspect equipment.
- 3. Know how to inspect and test remote controls without turning on abrasive metering valves.
- 4. Know how to adjust abrasive metering valves, lay out the blast hose and drain the moisture separator as well as operate all accessories furnished with the machine.
- K. Inspect blasting job sites periodically utilizing Attachment 6-1.
 - 1. Perform initial inspection before job starts.
 - 2. Perform weekly inspections thereafter.

5.0 Documentation Summary

Place in the Project Safety File:

- A. Completed inspection sheets.
- B. Training documentation.

6.0 Resources

- A. U.S. OSHA Standard Ventilation/Abrasive Blasting 29 CFR 1910.94 (http://www.osha-slc.gov/OshStd_data/1910_0094.html)
- B. U.S. OSHA Standard Other Portable Tools and Equipment 29 CFR 1910.244 (http://www.osha-slc.gov/OshStd_data/1910_0244.html)
- C. U.S. OSHA Standard Eye and Face Protection 29 CFR 1910.133 (http://www.osha-slc.gov/OshStd_data/1910_0133.html)
- D. Queensland Workplace Health and Safety Guide Abrasive Blasting (http://www.detir.qld.gov.au/hs/guide/gde30.pdf)

ATTACHMENT 6-1



DMG Health & Safety Program ABRASIVE BLASTING CHECK SHEET

Locatio	on: Job No:	Job No:		
Date Ir	spected: Name of Inspector:			
		Yes	No	N/A
1	Pre Job Activities of Section 1			
1.	The composition of materials to be blasted has been evaluated for lead, asbestos, other toxic metals			
2.	Abrasive material other than silica is being used.			
3.	A blasting material recovery system is in place. A method other than dry sweeping is used.			
4.	Waste media is not deposited in rivers or other environmentally sensitive areas.			
5.	A hazardous blasting zone has been established.			
6.	Eating and drinking are prohibited in the hazardous blasting zone.			
	Rre Job Activities		***	
7.	Air lines and connectors are inspected for wear and damage.			
8.	Gaskets on each connector are inspected and immediately replaced if worn, distorted or too soft.			
9.	Hoses are laid out where they will not obstruct workers.			
10.	Safety cables are installed on air line connections, including attachment to compressor manifold and blast machine inlet piping.			
on the second	Abrasive	atom P		
11.	Screened, non-contaminated and graded abrasive produced specifically for abrasive blasting is used.			
12.	Abrasive containing 1% or less crystalline silica (quartz) is used.			
13.	Mechanical lifting devices and/or vacuum loading equipment is used to handle abrasive.			
14.	Workers are using respirators when handling abrasive, especially during clean-up.			
13/23	Blast Machines			
15.	Fittings and valves are checked for tightness and operating conditions.			
16.	Worn gaskets are replaced immediately.			
4.7	Mechanical equipment is used to move blasting machines containing			

17.

18.

Steel air piping has not been replaced with hose.

ocati	on Inspected:Job No:			
part of	Blast Nozzle Design	Y app		
19.	Blast machine nozzles are equipped with Dead Man Control.			
20.	The remote control has not been taped down with tape, wire or any other material that will interfere with free movement of the lever.			
21.	The abrasive trap is cleaned daily to avoid restriction in air exhaust.			
	Screens and Covers			
22.	A blast machine screen is used to keep out debris.			
23.	Blast machines are covered when not in use to prevent entry of moisture.			
	Blast Hose and Coupling			323
24.	Hose couplings are inspected for wear and damage prior to use.			
25.	Couplings are wired together to prevent disengagement from accidental twisting.			
26.	Blast hose tube does not have worn out areas on the internal rubber tube.			
27.	Hose is inspected daily for soft spots.			
28.	The pressure rating of the blast hose is not exceeded.			
29.	Hoses are laid out in long curves, not sharp bends.			
(1) (1) (2) (3)	Nozzlesi	N. T. M. S.		1
30.	Nozzles are screwed completely and tightly into the nozzle holder.			
31.	Nozzles do not have an orifice size worn to more than 1/16 inch larger than its original size.			
200	Operator, Safety Equipment			
32.	Operators are using type CE air fed helmet.			
33.	Respirators, safety glasses, hearing protection, safety shoes, gloves and protective coveralls are worn by personnel inside the blasting zone.			
34.	Blasting helmets are checked for wear and damage before each use.			
35.	The cape and inner collar in the blasting helmet are present and in good condition.			
36.	Workers vacuum dust from helmet and clothing before removing them.			
	Breathing Air Supply		4236	
37.	When an air compressor or an air pump is used for breathing air, the air intake is positioned to prevent entry of engine exhaust and any other toxic gas.			
38.	A carbon monoxide monitor/alarm is installed on any source of breathing air			
39.	If an oil lubricated compressor is used for breathing air, it is equipped with overheating shut-off device or carbon monoxide alarm or both.			
REM	ARKS			
		_		
Name	Signature		Date	

D&MG SAFETY MANAGEMENT STANDARD AERIAL LIFTS

1.0 Applicability

This procedure applies to D&MG projects involving the use of scissors lifts, extensible boom platforms, aerial ladders, articulating boom platforms, vertical towers, or any combination thereof.

2.0 Purpose and Scope

The purpose of this procedure is to require the safe use and proper operation of aerial lifts and scissors.

3.0 Implementation

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

- A. Require that the manufacturer's operating instruction manual be available onsite.
- B. Allow only trained, authorized personnel to operate aerial lifts.
- C. Inspect the unit for unsafe conditions each day prior to use. Units that have been damaged or weakened from any cause must be taken out of service until repairs are completed.
- D. Test the lift controls each day to determine they are in safe working order.
- E. Require that both lower and platform controls are plainly marked as to their function.
- F. Survey the route to be traveled immediately prior to the work trip to check for overhead obstructions, holes in pavement, slopes, ditches, or other potential hazards.
- G. Wear fall protection in the form of a full body harness and lanyard attached to the manufacturer's prescribed anchorage point. Fall protection is not required for scissors lifts utilizing standard guard rails unless specifically required by the manufacturer.

- H. Stand firmly on the floor of the basket when working from an aerial lift. Sitting or climbing on the edge of the basket and/or use of planks, ladders, or other devices for work position are prohibited.
- Never exceed the boom and basket load limits set by the manufacturer.
- J. Set the braking system before elevating the basket.
- K. Install wheel chocks before using an aerial lift on an incline, provided they can be safely installed.
- L. Electrically ground or barricade aerial lifts when working near energized lines or equipment and consider the lift to be energized equipment.
- M. Do not pass equipment between a pole or structure and an aerial lift while an employee working from the basket is within reaching distance of energized conductors or equipment that are not covered with insulating protective equipment.
- N. Do not operate lower controls unless permission has been obtained from the employee in the basket, except in case of emergency.
- O. Alteration of the insulated portion of an aerial lift that may reduce the insulating value is not permitted.
- P. Never field modify an aerial lift for uses other than those intended by the manufacturer.

5.0 Documentation Summary

- A. File the following documents in the Project Health and Safety File
 - 1. Copy of the cover page of the Manufacturer's Operation Manual.
 - 2. Training documentation.
 - 3. List of authorized employees.

6.0 Resources

- U.S. OSHA Standard Aerial Lifts 29 CFR 1926.556 (http://www.osha-sic.gov/OshStd_data/1926_0556.html)
- B. U.S. OSHA Standard Mechanical Equipment 29 CFR 1926.952 (http://www.osha-sic.gov/OshStd_data/1926_0952.html)
- C. U.S. OSHA Standard Overhead Lines 29 CFR 1926.955 (http://www.osha-slc.gov/OshStd_data/1926_0955.html)

D&MG SAFETY MANAGEMENT STANDARD

ASBESTOS OPERATIONS (Surveys and abatement oversight)

1.0 Applicability

This procedure applies to D&MG asbestos field surveys and oversight activities conducted during asbestos removal projects.

2.0 Purpose and Scope

This procedure provides information relating to the performance of asbestos surveys and asbestos removal oversight/supervisory activities to protect the safety and health of the asbestos operations personnel involved in these activities. This procedure describes processes and requirements that will be used during the performance of the aforementioned activities incorporating both regulatory requirements and standard industry practices.

3.0 Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

A. Asbestos Surveys

For the purpose of this procedure, an asbestos survey is defined as anytime a sample of any type of building material is collected for the intent of assessing asbestos content.

1. Competent Person

Require that each project with an asbestos survey component is assigned an Asbestos Survey Competent Person to supervise asbestos field activities. The Competent Person shall meet the requirements of applicable standards for this position, and is responsible for seeing that the requirements of this procedure are implemented in the field (e.g., data collection, air monitoring, PPE use).

2. Training and Medical Monitoring

a) Training

Require that all personnel conducting asbestos surveys, including those associated with Phase I Environmental Site Assessments, have completed and successfully passed a building inspector's training course and associated refreshers in accordance with EPA's AHERA Model Accreditation Program (MAP) (U.S. operations) from an approved and/or accredited training provider.

b) Medical Monitoring

Require that personnel conducting asbestos surveys are placed in the D&MG Medical Surveillance Program (See SMS 24, "Medical Surveillance").

3. Personal Protective Equipment

Require that appropriate personal protective equipment (PPE) items are available and worn during asbestos surveys. See SMS 29, "Personal Protective Equipment".

4. Personal Monitoring and Initial Exposure Assessments

Conduct initial exposure assessments in accordance with SMS 43, "Personal Monitoring", unless sufficient data exists to indicate that such assessments are not necessary. Respiratory protection shall be worn until such assessments have been conducted and demonstrate respiratory protection is not warranted.

5. Collection Procedures of Suspect ACM Bulk Samples

- Collect samples after hours or when the building is not in use, if possible.
- b) Samples of suspect asbestos building materials shall be collected from area(s) already damaged, if possible.
- Prior to sample collection, place a drop cloth beneath the sample location.
- d) Selected sample location shall be wetted sufficiently prior to and, if necessary, during sample extraction to minimize fiber release.
- e) Use appropriate sample collection tool to extract the sample.
- f) Wet wipe the sample collection tool after sample extraction.
- g) Place sampled material in a pre-labeled container/package capable of being tightly sealed.

- h) Place collected sample container/package in a separate, larger package capable of being tightly sealed for a "double seal."
- i) Repair sample location as applicable to minimize and/or reduce further potential fiber release.
- j) Replace all wet wipes, drop cloth and disposable clothing and protective equipment into a labeled plastic bag. Seal and retain the bag until laboratory results are received. If all samples are negative for asbestos, dispose the bag as normal refuse. If any of the samples are positive, the waste bag must be handled as asbestos waste and disposed accordingly.

B. Asbestos Removal Oversight Activities

- 1. For the purpose of this procedure, asbestos removal oversight activities include, but may not be limited to, the following:
 - a) Performing visual observations either for the intent of verifying the removal contractor is complying with the approved work plan/removal specifications and/or verifying the asbestos abatement activities conducted by the removal contractor have been sufficiently performed.
 - b) Documenting daily work activities.
 - c) Collecting air samples that include background, work-in-progress and final air clearance samples.

2. Competent Person

Require that each project with an asbestos removal oversight component is assigned an Asbestos Oversight Competent Person to oversee or monitor asbestos field activities. The Competent Person shall meet the requirements of applicable standards for this position, and is responsible for seeing that the requirements of this procedure are implemented in the field (e.g., data collection, air monitoring, PPE use).

3. Training and Medical Monitoring

a) Training

Require that personnel have completed and successfully passed a "Contractor/Supervisor training" course and refreshers in accordance with EPA's AHERA MAP (U.S. operations) from an approved and/or accredited training provider.

b) Medical Monitoring

Require that personnel are participating in the D&MG Medical Surveillance Program (See SMS 24, "Medical Surveillance").

4. Personal Protective Equipment and Decontamination

a) Activities Inside Negative Pressure Containment

The following PPE items shall be worn when personnel enter a negative pressure containment area, either when asbestos removal is occurring or there is reasonable potential for exposure to airborne asbestos fibers (i.e., removing ceiling tiles prior to gross removal, inspecting areas reported as complete by the abatement contractor, etc.).

- (1) Full-face air purifying respirator with P100 (HEPA) filters.
- (2) Hooded Tyvek® coverall suit.
- (3) Hard hat.
- (4) Safety boots.
- (5) Fall protection system as appropriate (See SMS 40, "Fall Protection").
- b) Activities Outside Negative Pressure Containment

The following PPE items shall be worn when personnel are conducting activities outside a negative pressure containment area.

- (1) Safety glasses as appropriate.
- (2) Hard hat as appropriate.
- (3) Safety boots.
- (4) Fall protection system as appropriate (See SMS 40, "Fall Protection").

c) Miscellaneous

- (1) D&MG personnel shall adhere to the PPE policy of all clients and/or locations where these activities may occur if it is more stringent than the above requirements.
- (2) D&MG asbestos operations personnel shall contact a D&MG Health and Safety Program Representative, if necessary, for additional information regarding the proper use and/or types of PPE that should be used.
- d) Require project personnel to follow established site decontamination procedures.

5. Personal Monitoring and Initial Exposure Assessments

Evaluate air monitoring results for the project to evaluate whether respiratory protection used is appropriate for the exposure. In absence of appropriate monitoring conducted by other, conduct air monitoring in accordance with SMS 43, "Personal Sampling".

5.0 Documentation Summary

The following documents are required to be in the project safety file for each individual performing applicable asbestos operations activities.

- A. Training Certificates
- B. Medical Clearance Forms
- C. Appropriate State Licenses
- D. Air Monitoring Results
- E. Respirator Fit Test Records

6.0 Resources

- A. U.S. OSHA Standard Asbestos 29 CFR 1910.132 (http://www.osha-slc.gov/OshStd_data/1910_1001.html)
- B. U.S. OSHA Construction Standard Asbestos 29 CFR 1910.1001 (http://www.osha-slc.gov/OshStd_data/1926_1101.html)
- C. U.S. OSHA Technical Links Asbestos 29 CFR 1926.1101 (http://www.osha-slc.gov/SLTC/asbestos/index.html)
- D. AHERA MAP Training provisions and requirements (http://www.epa.gov/docs/epacfr40/chapt-l.info/subch-R/40P0763.pdf)
- E. U.K. 'Asbestos at Work' Regulations and the Asbestos Licensing Regulations
- F. Worksafe Australia Code of Practice for the Safe Removal of Asbestos (http://www.worksafe.gov.au/worksafe/fulltext/toc/h3-11.htm)
- G. Queensland Workplace Health and Safety Advisory Standards -Asbestos Removal (http://www.detir.qld.gov.au/hs/advisory/adv002.pdf)

D&MG SAFETY MANAGEMENT STANDARD CORROSIVE AND REACTIVE MATERIALS

1.0 Applicability

This program applies to D&MG office and field operations where corrosive or reactive materials are stored or used.

2.0 Purpose and Scope

This program provides information regarding the proper methods to store, handle and work with corrosive and reactive materials. This procedure considers a corrosive material as one that has a pH less than 2.0 (acid), or greater than 12.5 (base). A reactive material is a chemical that may be sensitive to shock, or may react with air or water depending upon its makeup.

3.0 Implementation

Office Locations - Implementation of this program is the responsibility of the Location Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4.0 Requirements

- A. Appoint a responsible person who will:
 - Inspect storage areas periodically.
 - 2. Monitor the quantity of corrosive and reactive materials on site as well as those incoming materials.
 - 3. Review work practices utilizing corrosive and reactive materials.
- B. Require that all employees working with corrosive or reactive materials, or who are working in close proximity to where such materials are being used or handled, are trained in accordance with SMS 2, "Worker Right to Know".
- C. Control the use of corrosive and reactive materials by D&MG personnel.
 - 1. Order only those materials and quantities that are needed to complete a job.

- 2. Check incoming corrosive and reactive materials for proper labeling.
 - a) Label materials if needed upon arrival on site.
 - b) Mark reactive materials containers with the date of receipt of the chemical.
- 3. Check incoming corrosive and reactive materials for materials safety data sheets. If MSDS are not already on file, order them from the manufacturer, distributor or vendor.
- 4. Add incoming corrosive and reactive chemicals to the hazardous materials inventory if not already on the inventory following procedures set forth in SMS 2, "Worker Right to Know".
- 5. Do not store any quantity of corrosive or reactive materials except consumer products in an office. These materials are to be stored off-site or at an on-site laboratory or storage area.
- D. Store corrosive and reactive materials appropriately.

Store corrosives and reactive materials as indicated on the Material Safety Data Sheet. In general, store these materials:

- 1. In a cool, dry environment, free from extremes of temperature and humidity.
- 2. In a manner that separates them from other materials (including flammables and oxidizers) and from each other.
 - a) Separate acids and bases.
 - b) Separate reactive materials from acids and bases, and protect from contact with water.
- On materials that are acid resistant (Teflon-coated, plastic, etc.) for small containers.
- Covered, not stacked on one another on acid resistant material for carboys (approximately 5 gallons/22 liters) in the same manner as small containers.
- 5. On individual racks or securely blocked on skids with closure (plug) facing upward to prevent leakage for drums.

E. Require that labeling & signage are in place.

Label containers with the appropriate warning word to indicate the hazard: DANGER; WARNING; CAUTION; CORROSIVE; OXIDIZER.

- F. Use corrosive and reactive materials appropriately.
 - 1. Safe-handling procedures will vary with each operation and type and concentration of the chemical, in all cases review the Material Safety Data Sheet and product information before use.
 - 2. Use personal protective equipment when working with or around corrosive and reactive materials.
 - Review the MSDS for the chemical used to determine the type of PPE needed.
 - b) Wear the following PPE as a minimum when working with corrosives and reactive materials:
 - (1) Chemical splash goggles. .
 - (2) Chemical resistant gloves.
 - (3) Chemical resistant apron.
 - 3. Obtain medical care immediately in the event of:
 - a) Skin or eye exposure (e.g., splash) to corrosive liquids.
 - Inhalation of vapors of corrosive liquids that cause respiratory discomfort.
 - 4. Require that an eyewash be located in all areas where acids or bases are used. Safety showers should be nearby if significant acid or base quantities are involved.
 - a) Place emergency eyewashes and showers in accessible locations that require no more than 10 seconds to reach and are in a travel distance no greater than 25 feet (7.5 meters) from the hazard.
 - b) Mark emergency eyewashes and showers with a highly visible sign.
 - c) Require the area around emergency eyewashes and showers to be well lighted and visible.
 - d) Require emergency showers to deliver a minimum 20 gallons (85 liters) per minute for 15 minutes.
 - e) Require emergency eyewashes to be capable of delivering to the eyes not less than 1.5 liters per minute for 15 minutes.

- G. Be prepared to clean up spills of corrosive and reactive materials.
 - Have a written spill response plan in place before materials are stored on site.
 - 2. Have commercially-available spill kits available for clean up of small quantities of materials.
 - 3. Clean up or respond to spills promptly.
 - 4. Do not use combustible organic materials (sawdust, excelsior, wood chips and shavings, paper, rags or burlap bags) to absorb or clean up spills.
- H. Dispose of corrosive and reactive materials appropriately.
 - 1. Segregate organic acids, inorganic acids, and basic wastes.
 - 2. Contract hazardous waste disposal services should be obtained to dispose of waste materials. All waste must be appropriately packaged for off-site transportation.
- I. Inspect corrosive and reactive storage and use areas periodically.
 - 1. Inspect office settings quarterly.
 - 2. Inspect field related project sites at least once a week.
 - 3. Use the inspection sheet provided as Attachment 9-1 to inspect sites.

5.0 Documentation Summary

File these records in the Office Safety Filing System:

- A. Completed Corrosive and Reactive Material Inspection Sheets.
- B. Worker Right to Know training documentation.

For field operations, file these records in the Project Safety File.

- A. Completed Corrosive and Reactive Material Inspection Sheets.
- B. Worker Right to Know training documentation.

6. Resources

- A. ANSI Z358.1-1990 American National Standard for Emergency Eyewash and Shower Equipment (http://web.ansi.org/public/std_info.html)

 B. U.S. OSHA Technical Links - Personal Protective Equipment
- (http://www.osha-slc.gov/SLTC/personalprotectiveequipment/index.html)
- C. U.S. OSHA Technical Links Hazard Communication (http://www.osha-slc.gov/SLTC/hazardcommunications/index.html)
- D. Australian Standards AS 3780 1994. The Storage and Handling of Corrosive Substances



D&MG Health & Safety Program CORROSIVE AND REACTIVE MATERIALS INSPECTION SHEET

ate Insp	pected: Name of Inspector:			
	"NO" answers Indicate an unsafe situation or problem	Yes	No	N/A
水温 菜	Labeling	語與政		28
1.	Containers are labeled with: Name of chemical Signal work (DANGER; WARNING; CAUTION, etc.) Manufacturer			
	Storage 1			
2.	Corrosives are stored in a cool, dry environment, free from temperature extremes.			
3.	Corrosives are stored in their properly labeled original containers and cushioned against shock.	· 4		
4.	Corrosives are not stored in the vicinity of oxidizers.			
5.	Hydrofluoric acid is stowed only in acid-proof polyethylene orceresin lined containers.			
6.	Corrosives are stored on acid resistant material (metal, plastic, etc.).			
7.	Chromic acid, nitric acid, perchloric acid, potassium permanganate (alloxiders) are stored separately from other corrosives and flammables.			
1. 物產	Handling		#N.7342	13. 13. 40.
8.	The minimum required PPE is used when working with corrosives: Chemical splash goggles. Chemical resistant gloves. Chemical resistant apron.			
9.	Bottles or carboys are opened slowly to guard from splashes.			
10.	The outside of the container is washed off with water after use to clean off any droplets of material.			
11.	An eyewash is located in all areas where corrosives are used.			
12.	 An eyewash is: Within 25 feet or 10 seconds travel. Marked with a visible sign. Well lit and visible. Working and delivering a minimum of 1.5 liters of water/min. for 15 minutes. 			
1,400 2540	Waste Disposal			
13.	Organic acid, inorganic acid and basic waste is kept segregated.			
14.	Only minor amounts of acid or base (less than 3 oz. or 100 ml are flushed down the drain into the sanitary sewer.			
15.	Corrosive wasted is turned in to a contract hazardous waste disposal company.			

ATTACHMENT 9-1

COMMENTS:	
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D&MG SAFETY MANAGEMENT STANDARD CONFINED SPACE ENTRY

1.0 Applicability

This procedure applies to D&MG projects involving confined space entry operations.

2.0 Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with confined space entry.

A confined space is:

- 1. Large enough for personnel entry, and
- 2. Has limited or restricted means for entry or exit, and
- 3. Is not designed for continuous occupancy.

A Non-Permit space is a confined space that does not present any potential hazards, nor will the work performed therein create a hazardous condition.

A Permit-Required space is a confined space that may present one or more potential hazards including hazardous atmospheres, fire/explosion, engulfment, entrapment, electrical, mechanical, or any other serious hazard. (Note for Australian operations - all confined space entries require a permit)

Permit required confined space hazards include risks of asphyxiation, fire or explosion, chemical exposure, engulfment or drowning, electrocution, or dismemberment.

This procedure applies to all permit required confined space entry activities performed by D&MG or any contractor and/or subcontractor.

Entry occurs whenever any body part crosses the plane of entry of the space.

3.0 Implementation

Field Operations - Implementation of this program is the responsibility of the Project Manager and Entry Supervisor.

4.0 Requirements

A. Appoint an Entry Supervisor who:

- 1. Determines whether a space is a "permit required" or non permit space.
- 2. Is responsible for onsite verification of acceptable entry conditions prior to entry.
- 3. Is responsible for assigning appropriately trained and medically qualified personnel to the project.
- 4. Has knowledge of required confined space entry equipment.
- 5. Has the ability to recognize and test hazardous atmospheres.
- 6. Is capable of performing a thorough hazard evaluation of the space and of the work that will be performed therein.
- 7. Understands how to execute a Confined Space Permit as well as any other required permit, such as a Hot Work permit.
- 8. Has authority to stop work and take corrective actions when conditions change.
- 9. Has had formal, documented training as a confined space Entry Supervisor.

B. Permit System

- 1. Utilize the "Confined Space Entry Permit and Procedures" form, Attachment 10-1, for permit space entry evaluation and establishment of required entry parameters.
- 2. Require confined space entry permits to be issued at least each shift by the Entry Supervisor.

C. Planning for Confined Space Entry

- 1. The Entry Supervisor:
 - a) Contacts the facility representative to gather information about the confined space and to determine if the facility has any entry requirements that must be followed.
 - b) Performs a Hazard Evaluation using the Confined Space Permit and Procedures for Entry Form, Attachment 10-1.

- c) Determines whether the space is a "permit required confined space" or a non-permit required confined space.
- d) Assesses whether those hazards that create the "permit required confined space" can be eliminated without employee entry into the space. By eliminating hazards that are immediately dangerous to life or health, administrative and rescue requirements are lessened and risk to workers is reduced.
- e) Determines rescue requirements for the space if so designated as a "permit required confined space".
- f) Arranges for qualified Entrants and Attendants.
- g) Obtains blank Confined Space Entry and Hot Work (if applicable) permit forms.
- h) Identifies all equipment, including personal protective equipment, needed for the job.
- i) Obtains all equipment and verifies that it is functional.
- j) Coordinates confined space entry activities with other site employers on site that may be affected by the entry. Will provide contractors with a copy of this written program.

D. Site Confined Space Preparation

1. Space Isolation

- a) Drain and clean the confined space as appropriate.
- b) Isolate the confined space as described on the Hazard Evaluation form or other applicable written procedures.
- c) Isolate all forms of potential energy inside the confined space, including:
 - 1) Electrical.
 - 2) Mechanical.
 - 3) Thermal.
 - 4) Pneumatic.
 - 5) Hydraulic.
- d) Isolate all lines carrying fuels, liquids or gases into the space.
- e) Develop alternate procedures for protection of entrants for lines which may not be controlled such as lines through stormwater or sewer vaults.
- f) Open the entry point to the confined space.
- g) Provide barricades and post the entrance of the space with a sign stating "Danger Confined Space Do Not Enter" or equivalent wording.

2. Electrical Equipment

- a) Provide electrical equipment that meets the electrical classification of the area. See SMS 12, "Electrical Safety".
- b) Route all portable electrical equipment through ground fault circuit interruption (GFCI) devices.

3. Atmospheric Tests

- a) Calibrate monitoring equipment and record information on the Daily Instrument Calibration Form.
- b) Make initial atmospheric tests of the space.
- c) Attach extension probes to the monitoring equipment, or lengths of silicone or similarly inert tubing material, to reach the bottom of the space. For horizontal spaces, the probe may need to be attached to a pole.
- d) Take atmospheric measurements in several locations (bottom, middle, top, corners) allowing extra response time from the instrumentation to register, especially if a tubing extension is used.
- e) Obtain reading for oxygen first, followed by %LEL, then for other contaminants of concern (if applicable).
- f) Record all results on the permit and sign and initial where indicated.
- g) Determine if acceptable entry conditions exist with respect to oxygen, %LEL, other hazardous atmospheres.
- h) If unacceptable entry conditions are indicated, correct the limiting condition.
- i) If acceptable entry conditions exist, determine times that the monitoring will be repeated or if continuous monitoring will be needed.
- j) Monitor continuously for oxygen and %LEL if hot work will be performed in the space.

4. Ventilation

- a) Ventilation is required for all Permit entries.
- b) Open as many openings as possible in the space to aid in cross ventilation.
- c) Never ventilate confined spaces with oxygen.
- d) Provide five (5) air changes per hour, or at least 10,000 cfm for large spaces.
- e) If a generator is used to provide power, be sure that the exhaust does not enter the space. Carbon monoxide monitoring may be required.
- f) Place blower ductwork such that it does not create a hazard by impairing the line of vision of attendants to observe space entrants, or by blowing contaminants to other workers.
- g) Provide at least 2,000 cfm of active exhaust ventilation for each welder or torch operating under a Hot Work Permit within the space.

h) Use fire/explosive proof ventilating equipment that is properly grounded when exhausting flammable gases, vapors and dusts from confined spaces.

5. Authorizing the Permit

- a) The Entry Supervisor personally inspects the work area and signs the permit after confirming that all necessary precautions have been taken and all relevant information concerning the entry parameters are documented on the permit.
- b) Conduct a briefing informing all entrants and attendants of space conditions.
- c) Require entrant(s) and attendant(s) to each print their names and sign the permit.
- d) Affix the permit to a location near the space entrance.

E. Entry Operations

- 1. Prohibit entry when oxygen deficient or flammable atmospheres are present in the space.
- 2. Limit entry to qualified entrants listed on the permit and only for the purpose stated on the permit.
- 3. Require entrants to follow all requirements listed on permit.
- 4. Attach body harness, if required, to a lifeline, and the other end of the life line is attached to a fixed point or to a mechanical lifting device outside the space at all times the entrant(s) are in the space.
- 5. Require that the attendant(s) remain at the entrance whenever an entrant is inside the confined space. The attendant may not be assigned other duties that may distract him/her from maintaining uninterrupted contact with the entrant(s). The attendant may only attend to one confined space entry at any one time. Each space must have its own attendant.

F. Exiting the Confined Space

- 1. Attendant will order entrant(s) out of space whenever:
 - a) A prohibited condition on the entry permit develops.
 - b) The surrounding work area becomes unsafe.
 - c) Any monitoring instrumentation, rescue equipment, ventilation, etc. becomes compromised.

- d) Possible symptoms of exposure are noted in the entrant(s).
- e) Entrant(s) express any type of concern regarding the safety of the entry.

G. Rescue

- 1. Require non-entry rescue procedures to be used for every entry.
- 2. Contract for qualified entry rescue services when non-entry rescue is not feasible in permit required confined spaces. Entry rescue must be staged on site adjacent to the space for the duration of the entry.

H. When the Entry Work is Complete

Cancel the permit by obtaining the signature of the entry supervisor and recording the time and date on the permit. This should be accomplished after the space is resealed and signs and barricades removed. If the space cannot be closed until a later time, provisions must be maintained (barricades, warning signs) to discourage persons from entering the space.

I. Audits of the Confined Space Entry Program

Annual audits of this Safety Management Standard will be conducted in accordance with the procedures set forth in the D&MG HSMS.

The Project Manager will require compliance with this SMS by reviewing Entry Permits on a weekly basis and document this review by notation on the permits.

J. Training

Require Entry Supervisors, Entrants, and Attendants to be trained to adequately address all health and safety aspects associated with entry.

K. Medical Surveillance

All Entry Supervisors, Entrants, and Attendants will be participants in the Division's medical surveillance program and medically qualified for confined space entry work.

5.0 Documentation Summary

Records required in the Project Safety File:

- A. Entry supervisor, Entrant and Attendant qualifications.
- B. Confined Space Entry Permits plus Hot Work Permits (if issued).
- C. Monitoring equipment calibration logs.
- D. Lock-out/Tag-out records (if used).
- E. Daily worker briefing documentation.
- F. Medical clearance documentation.

6.0 Resources

- U.S. OSHA Standard Permit Required Confined Spaces 29 CFR 1910, Subpart J (http://www.osha-sic.gov/OshStd_data/1910_0146.html)
- B. U.S. OSHA Technical Links Confined Spaces (http://www.osha-slc.gov/SLTC/confinedspaces/index.html)
- C. US Army Corp of Engineers EM 385-1-1, Section 06.I. (http://www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1/toc.htm)
- D. U.K. Factories Act
- E. Australian Standards AS 2865-1995. Safeworking in a Confined Space.
- F. Worksafe Australia Working in Confined Spaces (http://www.worksafe.gov.au/worksafe/fulltext/docs/h5/03297-13.htm)

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DAMES MOORE GROUP CONFINED SPACE PERMIT & PROCEDURES FOR ENTRY

ntry Authorized By:		. Ti	me Issued:	Date: Time expires:	
Reason(s) for Entry			Hazards	•	
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· · · · · · · · · · · · · · · · · · ·	 	•			
				-	
ISOLATION		-		······································	
Equipment to Lock/Tag/Test (including blocking	g, blanking, and/o	or disconnecting	electrical, hydraulic, pneumatic, kinetic, th	ennal, steam, chemical	. springs):
Equipment Name:	Isolated		Location:		Done
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					5.77
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ENTRY REQUIREMENTS:	Required	Checked		Required	Checked
Eye Protection	Required	Checked	Hot Work Permit	Required	1
Eye Protection - Safety Glasses	Required	Checked	Communications	Required	1
Eye Protection - Safety Glasses - Goggles	Required	Checked	Communications Air Mover(s)		
Eye Protection - Safety Glasses	Required	Checked	Communications Air Mover(s) Rescue Hoist and Other Relat		
Eye Protection - Safety Glasses - Goggles - Face Shield	Required	Checked	Communications Air Mover(s) Rescue Hoist and Other Relate Equipment		
Eye Protection - Safety Glasses - Goggles - Face Shield Hearing Protection	Required	Checked	Communications Air Mover(s) Rescue Hoist and Other Relat Equipment Rescue Lanyard		
Eye Protection - Safety Glasses - Goggles - Face Shield Hearing Protection Fall Protection	Required	Checked	Communications Air Mover(s) Rescue Hoist and Other Relat Equipment Rescue Lanyard GFCI Protected Electrical		
Eye Protection - Safety Glasses - Goggles - Face Shield Hearing Protection	Required	Checked	Communications Air Mover(s) Rescue Hoist and Other Relat Equipment Rescue Lanyard GFCI Protected Electrical Explosion Proof		
Eye Protection - Safety Glasses - Goggles - Face Shield Hearing Protection Fall Protection Respiratory Protection	Required	Checked	Communications Air Mover(s) Rescue Hoist and Other Relat Equipment Rescue Lanyard GFCI Protected Electrical Explosion Proof Lighting/Electrical		
Eye Protection - Safety Glasses - Goggles - Face Shield Hearing Protection Fall Protection Respiratory Protection - 1/2 Face Disposable	Required		Communications Air Mover(s) Rescue Hoist and Other Relat Equipment Rescue Lanyard GFCI Protected Electrical Explosion Proof Lighting/Electrical Non-sparking Tools		
Eye Protection - Safety Glasses - Goggles - Face Shield Hearing Protection Fall Protection Respiratory Protection - 1/2 Face Disposable - 1/2 Face Cartridge	Required	Checked	Communications Air Mover(s) Rescue Hoist and Other Relat Equipment Rescue Lanyard GFCI Protected Electrical Explosion Proof Lighting/Electrical Non-sparking Tools Ladders	eed	
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D&MG SAFETY MANAGEMENT STANDARD DEMOLITION

1.0 Applicability

This procedure applies to D&MG projects involving demolition activities.

2.0 Purpose and Scope

The purpose of this procedure is to establish safe work practices for manual and mechanical demolition activities.

3.0 Implementation

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

A. Preparatory and General Operations

- Appoint a Competent Person to conduct a pre-demolition engineering survey to determine the condition of the framing, floors, and walls, and possibility of unplanned collapse of any portion of the structure. Survey adjacent structures in the same manner, and make a written record of these surveys. See Attachment 11-1, "Pre-Demolition Survey."
- 2. Determine if any asbestos, lead, or other hazardous materials are present within the structure. If so, refer to the appropriate D&MG SMS for the proper procedure for each specific material.
- 3. Notify, in advance, any utility companies involved, and require that all electric, gas, water, steam, sewer, or other service lines are shut off or otherwise controlled.
- 4. Relocate, as needed, and protect any utility lines providing utilities which it may be necessary to maintain during demolition.
- 5. Determine if any type of hazardous chemicals, gases, explosives, flammable materials, or other dangerous substances have been used in any tanks, pipes, or other equipment. If so, perform testing and purging prior to the start of demolition activity.

- 6. Refer to SMS 40, "Fall Protection" for wall/floor opening and fall protection requirements.
- 7. Brace or shore walls and floors of structures that have been damaged by fire, flood, explosion, or other cause if employees will be required to work within the structure.
- 8. Barricade and provide warning signs for areas into which material is dropped through holes in floors without the use of chutes. The barricade must be at least 42 inches (106 cm) high and 6 feet (2 meters) back from the projected edge of the opening above. Do not permit removal activities on these lower levels until debris handling ceases above.
- 9. Protect employee entrances to multi-story buildings with sidewalk sheds or canopies. Protection must extend a minimum of eight feet (2.4 meters) from the face of the building, and one foot (30 cm) on each side of the entrance.
- Conduct daily inspections prior to the start of work to identify and correct unsafe conditions.
- 11. Conduct weekly inspections using Attachment 11-2, "Demolition Safety Checklist."
- B. Stairs, Ladders, and Passageways
 - 1. Designate stairways, passageways, and ladders that are to be used for access, and keep other access ways entirely closed off at all times.
 - 2. Inspect all stairs, passageways, and ladders frequently, and maintain them in a clean, safe condition.
 - 3. Require that adequate natural or artificial lighting is provided in stairwells that are being used. Refer to Attachment 11-3.

C. Chutes

1. Do not drop material to any point lying outside the exterior walls of the structure unless the area is effectively protected.

2. When using chutes, require that:

- a) All material chutes at an angle of more than 45 degrees from the horizontal are totally enclosed.
- b) Closures are provided for openings at floor levels where materials are inserted.
- c) The chute openings do not exceed 48 inches (1.2 meters) in height measured along the wall of the chute.
- A substantial gate is installed at or near the discharge end of the chute.
- e) A competent employee is assigned to control the gate and the backing and loading of trucks.
- f) The discharge end of the chute is securely closed off when operations are not in progress.
- g) Chute openings are protected by a substantial guardrail approx. 42 inches (106 cm) in height. See SMS 40, "Fall Protection"
- h) Any space between the chute and the edge of openings in the floors through which it passes are solidly covered over. See SMS 40, "Fall Protection".
- i) A stop-log, measuring at least 4"x 6" (10 cm x 15 cm), is installed at the edge of each chute where the material is dumped from mechanical equipment or wheelbarrows.

D. Removal of Materials Through Floor Openings

- 1. Do not cut an opening in a floor for material disposal larger than 25% of the total floor area unless the lateral supports of the removed floor remain in place.
- 2. Shore all floors that are weakened or made unsafe by demolition operations to safely carry the maximum intended imposed load.

E. Removal of Walls, Masonry, and Chimneys

- 1. Do not permit employees to work on top of a wall when weather conditions constitute a hazard.
- 2. Do not allow masonry walls to fall on floors in quantities that exceed the safe carrying capacities of the floors.
- 3. Provide ladders or walkways to allow employees to safely reach or leave any scaffold or wall.
- 4. Do not permit any wall section which is more than one story in height to stand alone without lateral bracing, unless the wall was originally designed and constructed to stand alone, and is in a condition safe enough to be self-supporting.
- 5. Leave all walls in stable condition at the end of each shift.
- 6. Do not cut or remove any structural or load-supporting members on any floor until all stories above have been demolished and removed. This does not prohibit the cutting of floor beams for material disposal, provided that the shoring and flooring requirements outlined elsewhere in this SMS are met.
- 7. Plank floor openings solid within 10 feet (3 meters) of any wall being demolished, unless personnel are kept out of the area below.
- 8. In buildings of "skeleton-steel" construction, the steel framing may be left in place during demolition of the masonry. If this is done, clear all steel beams, girders, and other supports of loose material as the demolition progresses downward.
- 9. Provide planking as described in the next subsection for workers engaged in steel razing when floor arches have been removed.
- 10. Dismantle steel construction column length by column length, and tier by tier.
- 11. Do not demolish retaining walls that support earth or adjoining structures until the earth has been properly braced or structures have been properly underpinned.
- 12. Require that walls used as retaining walls for piling debris are capable of supporting the imposed load.

F. Manual Removal of Floors

- 1. Remove all debris and materials from floor arches and adjacent areas for a distance of 20 feet (6 meters) before beginning demolition.
- 2. Barricade areas directly underneath floor arches that are being demolished, and do not allow employees in the area.
- 3. Provide planking, not less than 2"x10" (5 cm x 25 cm) full size undressed, for employees to stand on while breaking down floor arches between beams.
- 4. Position the planks to provide a safe support for the workers should the arch between the beams collapse. Allow no more than 16 inches (40 cm) of open space between the planks.
- 5. Require that openings cut in a floor extend the full span of the arch between supports.
- 6. Provide walkways at least 18 inches (45 cm) wide, made of planks at least 2 inches (5 cm) thick, when necessary to enable workers to reach areas without walking on exposed beams. Install guardrails in accordance with SMS 40, "Fall Protection".
- 7. Lay planks over solid bearings with the ends overlapping at least 1 foot (30 cm).
- 8. Install stringers of adequate strength to support the walkway planks.
- 9. Require that the ends of the stringers are supported by girders or beams, and not by floor arches alone.

G. Removal of Walls, Floors, and Material with Equipment

- 1. Do not use mechanical equipment on floors or working surfaces unless they are of sufficient strength to support the imposed load.
- 2. Install curbs or stop-logs at floor openings to prevent equipment from running over the edge.
- 3. Require that all mechanical equipment complies with SMS 19, "Heavy Equipment Operations".

H. Storage of Debris

- 1. Do not exceed the allowable loads when storing materials on floors.
- 2. Do not remove wooden floorboards more than 1 floor above grade for storage of debris, and require that falling material does not endanger the stability of the structure.
- 3. Do not remove floor arches more than 25 feet (7.6 meters) above grade to provide a storage area for debris, and require that floor arch removal does not endanger the stability of the structure.
- 4. Leave wood beams in place to brace interior walls or free-standing exterior walls until other support can be installed to replace them.
- 5. Block off storage space into which material is dumped, except for openings necessary for removal of the material.
- Keep openings closed at all times when material is not being removed.

I. Mechanical Demolition

- 1. Designate a competent person to perform continuing inspections as the work progresses to detect hazards resulting from weakened or deteriorated floors or walls, or loosened material.
- 2. Do not permit employees to work in areas where such hazards exist until they are corrected by shoring, bracing, or other means.
- 3. Do not permit anyone in any area where potential hazards exist when balling, clamming, or grappling is being performed. Allow only those workers necessary for the performance of operations in these areas at any other time.
- 4. Require that the weight of the demolition ball does not exceed 50% of the crane's rated capacity, based on maximum boom length and angle at which the ball will be used, or 25% of the nominal breaking strength of the line by which it is suspended, whichever is less.
- 5. Keep the crane boom and loadline as short as possible.
- 6. Attach the ball to the loadline using a swivel-type connection to prevent twisting of the loadline, and with a positive means to prevent the ball from becoming accidentally disconnected.

- 7. Remove all roof cornices or other ornamental stonework before pulling walls over.
- 8. Cut all affected steel members free prior to pulling walls over.

5.0 Documentation Summary

File the following in the Project Health and Safety File:

- 1. Pre-demolition Engineering Survey.
- 2. Qualifications of Demolition Competent Person.
- 3. Hazardous Material Survey Documentation.
- 4. Utility Verifications.
- 5. Weekly Demolition Safety Checklist.

6.0 Resources

- A. National Association of Demolition Contractors, Safety Manual (http://www.demolitionassn.com/)
- B. U.S. OSHA Standard Demolition 29 CFR 1926, Subpart T (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_T.html)
- C. U.S. OSHA Standard Cranes, Derricks, Hoists 29 CFR 1926, Subpart N
 (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_N.html)
- D. U.S. OSHA Standard Mechanized Equipment -29 CFR 1926, Subpart O (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_O.html) U.S. OSHA Standard - Fall Protection - 29 CFR 1926, Subpart M (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_M.html)
- E. Australian Standards AS 2601-1991. The Demolition of Structures
- F. Queensland Workplace Health and Safety Demolisher's Workplace HASP
 (http://www.detir.qld.gov.au/hs/workplan/commcal/com04.pdf)
- G. Queensland Workplace Health and Safety -Advisory Standard for Falling Objects (http://www.detir.gld.gov.au/hs/advisory/adv006v2.pdf)
- H. Queensland Workplace Health and Safety PPE in Building Work (http://www.detir.qld.gov.au/hs/advisory/adv020v1.pdf)

Attachment 11-1



D&MG Health & Safety Program PRE-DEMO ENGINEERING SURVEY

JOB NAME:			JOB LOCATION:				
JOB CONT.	ACT:		_ PHONE NUMB	BER:			
NAME OF S	STRUCTURE:			_ DATE BUIL	T:		
STRUCTUE	RE DIMENSIONS: LENG	STH	WIDTH		HEIGHT		
MATERIAL	S: FOUNDATION			WALLS _			
	FLOORS			ROOF			
METHOD C	OF DEMOLITION						
UNDERGR	OUND UTILITY CONFIRM.	ATION NUMBE	ER:		·		
POTENTIA	L HAZARDS (1.E. COLLAP	SE, STRUCTU	RAL FAILURE)				
						·	
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	# SAFETY ⇒ 5+ EXPOSURES 5	YES NO.	LOC	ATION/DES	CRIPTION		
	Oxygen Lines						
	Natural Gas Lines						
	Electrical Lines						
	Water Lines						
	Other Utility Lines						
	Fire Hazards						
	Adjacent Walkways			-			

Adjacent Roadways

JOB NAME:	JOB LOCATION:
000117111111111111111111111111111111111	000 200/11/011

SAFETY/ EXPOSURES	YES	NO.	LOCATION/DESCRIPTION LA
Adjacent Buildings			
Combustibles			
Water Towers			
Smoke Stacks			·
Elevators			
Party Walls			
Basements			
Pits or Trenches			
Bulkheads			
Manholes to Preserve			
MSDS Provided			
Fall Hazards			
Lead Exposure			
Chemical Exposure			
Process Hazard			

OB NAME:	<u></u>		JOB LOCATION:
SAFETY	WES	NO.	LOCATION/DESCRIPTION
Live Utilities			
Utilities to Shut Down			
Lighting			
Telemetering Lines			·
Fiber Optic Cables			
Trenching/Excavating			* *
Shoring Required			
Pre-existing Structura Damage			
OTHER SAFETY ISSUES			



Health and Safety Program

Attachment 13-4

DAILY EXCAVATION / TRENCH INSPECTION REPORT

Competent Person:	Date:	
Project Name:	Weather Conditions:	
Project Location:	Rainfall Amounts 24 hours Previous:	

"I hereby attest that the following conditions existed and that the following items were checked or reviewed during this inspection".

Check Yes, No or N/A for Not Applicable. If comment is required, circle the number and see Page 2.

		Yes	No	N/A
1.	Are barricades or covers in place and in good condition?	0	0	0
2.	Have any tension cracks observed along top on any slopes?	0	0	0
3.	Is excavated material at least 2' from the edge of the excavation.	0	0	0
4.	Are slopes cut at design angle of repose?	0	0	0
5.	Is any water seepage noted in trench walls or bottom?	0	0	0
6.	Are pumps in place or available if needed?	0	0	0
7.	Is bracing system installed in accordance with design?	0	0	0
8.	Is there evidence of significant fracture planes in soil or rock?	0	0	0
9.	Is there any evidence of caving or sloughing of soil since the last inspection?	0	0	0
.10.	Are there any zones of unusually weak soils or materials not anticipated?	0	0	0
11.	Are there any noted dramatic dips or bedrock?	0	0	0
12.	Are all short-term trench(s) covered within 24 hours?	0	0	0
13.	Have non-compliance items been photographed?	0	0	0
14.	Are hydraulic shores pumped to design pressure?	0	0	0
15.	Is shoring being used secure?	0	0	0
16.	Does plan include adequate safety factor for equipment being used?	0	0	0
17.	Is traffic adequately away from trenching operation?	0	0	0
18.	Are barricade up and secure?	0	0	0
19.	Are there trees, boulders or other hazards in area?	0	0	0
20.	Is vibration from equipment or traffic to close to trenching operation?	0	0	0
21.	Are trench box(s) certified?	0	0	0
22.	Are GFCI's used on ALL temporary electrical cords?	0	0	0
23.	Is access and egress located every 25 feet?	0	0	0
24.	Is hazardous testing done on a regular basis?	0	0	0
25.	Has rescue procedure been established and is equipment immediately available?	0	. 0	0



Health and Safety Program

Attachment 13-4

DAILY EXCAVATION / TRENCH INSPECTION REPORT

nments: Place que	 ·		
	-		

D&MG SAFETY MANAGEMENT STANDARD FIRE PREVENTION AND PROTECTION

1.0 Applicability

This procedure applies to D&MG office and project locations.

2.0 Purpose and Scope

The purpose of this procedure is to reduce/eliminate potential fire hazards in the workplace and to provide for a rapid, effective response should a fire occur.

3.0 Implementation

Office Locations – Implementation of this procedure is the responsibility of the Location Manager.

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

General

- A. Develop an Emergency Action Plan as outlined in SMS 3, "Emergency Action Plan."
- B. Maintain good housekeeping to reduce fire hazards and to provide safe routes of egress should a fire occur.
- C. Provide the appropriate number and types of fire extinguishers for the operations being performed. Refer to Attachment 14-1 for guidance.
- D. Inspect fire extinguishers monthly and maintain an inspection log.
- E. Conduct frequent periodic inspections to identify fire hazards such as:
 - 1. Unnecessary accumulation of combustibles.
 - 2. Unnecessary storage of flammables.
 - 3. Sources of ignition (e.g., faulty wiring, sparks, open flame, etc.).

- F. Remove all fire hazards promptly.
- G. Prohibit smoking and other ignition sources in flammable storage and other fire hazard areas.
- H. Post emergency numbers near telephones and evacuation maps in appropriate locations.
- I. Conduct evacuation drills.
- J. Train employees in:
 - 1. Fire hazard recognition.
 - 2. Fire hazard prevention.
 - 3. Fire extinguisher use.
 - 4. Emergency and evacuation procedures.

5.0 Documentation Summary

File the following in the Office/Project Health and Safety File:

- A. Emergency Action Plans.
- B. Fire extinguisher inspection logs.
- C. Employee training documentation.
- D. Site audits.
- E. Evacuation drills.

6.0 Resources

- A. U.S. OSHA Standard Means of Egress 29 CFR 1910, Subpart E (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1910_SUBPART_E.html)
- B. U.S. OSHA Standard Employee Emergency Plans and Fire Prevention Plans 29 CFR 1910.38 (http://www.osha-slc.gov/OshStd_data/1910_0038.html)
- C. U.S. OSHA Standard Fire Protection 29 CFR 1910, Subpart L (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1910_SUBPART_L.html)
- D. U.S. OSHA Technical Links Fire Safety (http://www.osha-slo.gov/SLTC/firesafety/index.html)

- E. U.S. OSHA Construction Standard Fire Protection and Prevention 29 CFR 1926, Subpart F (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_F.html)
- F. USACE EM 385-1-1 Section 9 Fire Prevention and Protection (http://www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1/toc.htm)
- G. U.K. 'Fire Precautions' Regulations
- H. Australian Standards AS 1851.1-1995. Maintenance of Fire Protection Equipment Portable Fire Extinguishers and Blankets
- 1. Australian Standards Collection 15 Fire Extinguishing Equipment



D&MG Health & Safety Program FIRE EXTINGUISHER PLACEMENT GUIDELINES

1. Fire Extinguishers – General

The following are minimum requirements for fire extinguisher placement in office buildings, construction facilities, support buildings, and/or buildings under construction. In some cases, client requirements may be more stringent, in which case the client's requirements supercede the guidelines below.

- a. A fire extinguisher, rated at a minimum of 2A, must be provided for each 3,000 square feet of the protected building area, or major fraction thereof. Travel distance from any point of the protected area to the nearest fire extinguisher shall not exceed 100 feet.
- b. At least one fire extinguisher, rated at a minimum of 2A, must be provided on each floor. In multi-story buildings, at least one fire extinguisher must be located adjacent to the stairway.
- c. Where more than 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas are being used, a fire extinguisher, rated at least 10B, must be provided within 50 feet.
- d. Portable fire extinguishing equipment, suitable for the fire hazard involved, must be provided at convenient, conspicuously accessible locations in Yard Storage areas. Portable fire extinguishers, rated at least 2A, shall be placed so that maximum travel distance to the nearest unit does not exceed 100 feet.

2. Flammable/Combustible Liquid Storage

The following are minimum requirements for fire extinguisher placement in flammable/combustible liquid and gas storage areas. In some cases, client requirements may be more stringent, in which case the client requirements supercede the guidelines below. Refer to SMS 15, "Flammable and Combustible Liquids and Gases, Attachment 2".

a. At least one portable fire extinguisher, rated at least 20B, must be located outside of, but not more than 10 feet from, the door opening into any room used for storage of more than 60 gallons of flammable or combustible liquids.

- b. At least one portable fire extinguisher, rated at least 20B, must be located not less than 25 feet, nor more than 75 feet, from any flammable liquid storage area located outside.
- c. At least one portable fire extinguisher, rated at least 20BC, must be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable/combustible liquids.
- d. At least one fire extinguisher, rated at least 20BC, must be provided within 75 feet of each pump, dispenser, underground fill pipe opening, and lubrication/service areas.
- e. At least one fire extinguisher, rated at least 20BC, must be provided at each LPG container storage area.

3. Hot Work

A minimum of one fire extinguisher, rated at least 20BC, must be provided for each hot work location. The extinguisher should be conspicuously positioned no more than 10 feet from the hot work. Refer to SMS 20, "Hot Work".

D&MG SAFETY MANAGEMENT STANDARD FLAMMABLE AND COMBUSTIBLE LIQUIDS AND GASES

1.0 Applicability

This procedure applies to D&MG office and field operations where flammable and combustible liquids and gases are stored or used.

2.0 Purpose and Scope

The purpose of this procedure is to provide information regarding the proper storage, handling and work practices associated with flammable and combustible liquids and gases.

3.0 Implementation

Office Locations - Implementation of this program is the responsibility of the Location Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4.0 Requirements

- A. Appoint a Responsible Person who will:
 - 1. Inspect storage areas periodically.
 - 2. Monitor the quantity of flammable and combustible liquids and gases on the site.
 - 3. Review work practices.
- B. Control flammables, combustibles, and flammable gases entering the site.
 - 1. Order only those materials and quantities that are needed to complete a job.
 - 2. Check compliance with SMS 2, "Worker Right to Know".

C. Storage

- 1. Store flammable and combustible materials in appropriate tanks and containers. See Attachment 15-1.
- 2. Limit building storage outside of a flammable storage cabinet or storage room per Attachment 15-1.
- 3. Store oxidizers separately from flammables.
- 4. Segregate gas cylinders for storage based on their hazard (keep oxygen and acetylene cylinders stored separately).

D. Labeling and Signage

- Post a "NO SMOKING OR OPEN FLAME" sign in all areas where flammable and combustible materials are stored, handled, and processed.
- 2. Require all containers and cylinders to be labeled with the contents and hazard-warning label.

E. Use of Materials on Site

- 1. Use flammable, combustible, and compressed gases in a manner that is consistent with the label and material safety data sheet for the product.
- 2. Use only those amounts of materials needed for the job. Transfer of flammables, combustibles, oxidizers to ready use containers is encouraged.
- 3. Use personal protective equipment stated on the product label and material safety data sheet.

F. Spill Control

- 1. Have a written spill response plan in place before materials are stored on site.
- 2. Clean up or respond to spills promptly.

G. Disposal

- 1. Keep solvent waste and flammable liquids in fire resistant, covered containers until they are removed from the worksite.
- 2. Do not place flammable or combustible waste in municipal garbage.
- 3. Dispose of flammable hazardous materials with a licensed hazardous material disposal company.

H. Inspection

- 1. Periodically inspect flammable and combustible storage and use areas; gas storage areas and oxidizer storage areas:
 - a) Office settings inspect quarterly.
 - b) Field related projects, inspect once a month.
- 2. Use the inspection sheet provided as Attachment 15-2 to inspect the storage areas.

I. Training

Require that Hazard Communication training includes specific hazard information for the flammables, combustibles and oxidizers used.

5.0 Documentation Summary

- A. File these records in the Office Safety Filing System:
 - 1. Location of the MSDS inventory.
 - 2. Completed Flammable and Combustibles Inspection Checklist.

- B. File these records in the Project Safety Filing System:
 - 1. Attach program to Project Safe Work Plan.
 - 2. File these records in the Project Safety File.
 - a) Location of the MSDS inventory
 - b) Completed Flammable and Combustible Inspection Checklist.

6.0 Resources

- A. National Fire Protection Association Standard 58 (http://catalog.nfpa.org/)
- B. Regulations of the U.S. Coast Guard (http://www.uscg.mil/hq/g%2Dm/mse4/cfr.htm)
- C. U.S. OSHA Standard Flammable and Combustible Liquids 29 CFR 1910.106 (http://www.osha-slc.gov/OshStd_data/1910_0106.html)
- D. U.K. 'Highly Flammable Liquids' and 'Liquid Petroleum Gases' Regulations
- E. Australian Standards AS 1940-1993. The Storage and Handling of Flammable and Combustible Liquids



D&MG Health & Safety Program

Flammable and Combustible Liquid Classifications

Flammable Liquid	Flash Point Co.	Boiling Point
Class 1A	<73 ° F	<100 ° F
Class 1B	<73 °F	>100 ° F
Class 1C	>73 ° F<100 ° F	
Combustible liquid		
Class 2	>100 ° F<140 ° F	
Class 3	≥140 °F	

Maximum Allowable Size of Containers and Portable Tanks

i	L. Me. Sela	mmable Liqu	ids	Combustil	ole Liquids 🕃
Container Type	Class IA	Class IB	Class IC	Class II	Class III
Glass or approved plastic	1 pt	1 qt	1 gal	1 gal	1 gal
Metal (other than DOT drums)	1 gal	5 gal	5 gal	5 gal	5 gal
Safety cans	2 gal	5 gal	5 gal	5 gal	5 gal
Metal drums (DOT specifications)	60	60	60	60	60
Approved portable tanks	660 gal	660 gal	660 gal	660 gal	660 gal

Maximum Storage in Buildings Outside of Storage Cabinet or Storage Room

L. Type	26 Amount
Class 1A	25 gallons
Class 1B (containerized)	120 gallons
Class 1B (single portable tank)	660 gallons
Class 1C (containerized)	120 gallons
Class 1C (single portable tank)	660 gallons
Class 2 (containerized)	120 gallons



D&MG Health & Safety Program FLAMMABLE, COMBUSTIBLE, OXIDIZER & COMPRESSED GAS INSPECTION CHECKSHEET

Location Inspected:		Job No:			
Date Inspected:	Name of Inspector:	- · · · · · · · · · · · · · · · · · · ·			
			No	Not Applicable	
Storage/Cabinets		West Control	STANKE AND A		
Flammable cabinets do not obstru					
No more than 60 gallons of flamm liquid is stored in a cabinet.	nable or 120 gallons of combustible		4 -		
No more than three cabinets are	located in a storage area.				
Metal storage cabinets have self-	closing doors.				
Cabinets are labeled "FLAMMAB	LE-KEEP FIRE AWAY"				
Safety Cans		et in the			
Safety cans are constructed of st	ainless steel, Monel or tin.				
filling and pouring spouts.	r and spring-loaded cap on both the				
Drumi8 Drum Storage Areas					
Drums are stored in a vertical pos	sition.				
Bungs are closed when liquid is r	not being transferred.				
Drums are shielded from the sun					
Funnels with installed flash arres flammable liquids into drums.	tor are used when transferring				
A minimum distance of 25 feet be buildings is present.	etween a drum storage area and				
A "NO SMOKING" sign is posted	in the area.				

An emergency spill kit is near the drum storage area.

than 50 feet from the storage area.

A 20 lb. dry-chemical fire extinguisher is no less than 10 feet or more

Waste Cans	WES!	NO/	IL N/A
Combustible scrap, debris and waste materials (oily rags, etc.) are stored in covered metal cans.			
Waste cans are removed from the work area daily.			
Waste cans have spring-loaded self-closing lids.			
tStorageiRooms:Designed Specifically For Flammables	计算图形		
Room construction meets NFPA fire-resistance requirements.			
Rooms with automatic extinguishing systems have the following:			
 noncombustible liquid-tight raised sills or ramps at least 4 inches in height. 		-	
 flooring at least four inches below the surrounding floor, or an open grated trench that drains to a safe location. 			
 openings with approved self-closing fire doors. 			
 liquid-tight construction where the walls join the floors. 			
 shelving, racks, dunnage floor overlay and other interiors with one inch wood. 			
Rooms are ventilated by a gravity or mechanical exhaust system that:			
 commences not more than 12 inches above the floor. 			
 is designed to provide for a complete change of air within the room at least six times per hour. 			
 is controlled by a switch located outside the door, with ventilating equipment and any light fixtures operated from the same switch. 			
Flammable: & Combustible Storage: Areas Within Buildings		学院成	
At least one portable fire extinguisher rated not less than 20-B is located outside of but not more than ten feet from the door opening into any room used for the storage of more than sixty gallons of flammable or combustible liquids.			
Buildings or rooms are locked when not occupied.			
Exits, stairways or passageways are not used for storing flammables and combustibles.			
No more than 25 gallons of Class IA or 60 gallons of Class IB; II or III liquids is located in a room outside of a flammable storage locker or flammable storeroom.			
An aisle at least three feet wide is maintained in storage areas.			
No more than those amounts needed for one day's use are stored in buildings under construction.			

Outside/Storageiot/Flammable/and/Combustible/Liquids	EYES!	L.NO	-N/A
At least one portable fire extinguisher having a rating of not less than 20-B is located not less than twenty-five feet or more than 75 feet from any outside flammable liquid storage area.			
For containers not more than 60 gallons each, no more than 1,100 gallons in any one group are stored.			
Groups of containers are separated by five-foot clearances.			
Groups of containers are more than fifty feet from buildings.			
Portable tanks (not exceeding 660 gallons in capacity) are provided with emergency venting devices as specified by NFPA 30.		-	
Storage areas are free of accumulation of weeds, debris, and other combustible materials not necessary to the storage.			
Storage Tanks			*********
Tanks have relief vents.			
Tank vents are not close to open flames, stacks, heating apparatus, or any other source of ignition.			
A dike or curb or other suitable means to prevent the spread of leakage from tanks.			
Diked areas have a capacity equal in volume to at least that of the largest tank plus 10 % of all other tanks in the enclosure.			
Provisions to drain off accumulations of ground or rainwater or spills in diked areas.			
Dispensing of Flammable and Combustible Liquids	THE RES	FYT PART	C. T. S. C.
Dispensing outlets for above ground tanks with nationally listed automatic-closing valve, without a latch-open device.			
Dispensing Systems are electrically bonded and grounded.			
Tanks, hoses and containers of five gallons or less in metallic contact while transferring flammable liquids.			
Electrically bonded systems are used for transferring flammable liquids in containers in excess of five gallons.			
Closed piping systems are used for drawing flammable liquids during transfer.			
Flammables and combustibles are drawn from a container or portable tank by use of gravity or through a pump using an approved self-closing valve.			

Liquefied Petroleum Gas - Refueling	**YES	Ž⊹NO.	N/A
Equipment is shut down during refueling operations.	}		
Leather gloves and safety glasses are worn during refueling operations.			·
Smoking and hot work is prohibited during refueling.			
Refueling occurs at least 25 feet from buildings.	<u> </u>		
Compressed Gases - Storage Walling Ave.	TON Y	第一个	下的研究。并为
Cylinders must be capped when regulators are removed.			
Oxygen and fuel cylinders are stowed in designated well-ventilated areas.			
Storage areas have temperatures less than 130 degrees.			
Cylinders are stored upright and secured from falling over.			
Cylinders are in segregated groups by gas type and not intermingled with other cylinders.			
Oxygen cylinders are stored at least 20 feet away from flammables. (A fire resistive partition of at least 1-hour fire resistance rating of at least 5-foot height may also be used.)			
Flammable or combustible materials are kept at least 20 feet away from stored cylinders.			
Gas cylinder valves are protected from snow and ice during winter months.			
Oxygen cylinders are kept free from oil and grease.			
Welding cylinders are securely fastened to ready-use racks.			
Smoking or open flames are not permitted in areas where cylinders are stored.			
Cylinder storage areas are posted with the following sign: "DANGER - NO SMOKING OR OPEN FLAME"			
Cylinders are labeled with gas contents and warning statement.			
Empty cylinders are segregated from full cylinders.			
Oxidizers	以 第2 第2 第3 第3 第3 第3 第3 第3 第3 第3 第3 第3		第一个
Oxidizers are stored separately from flammables.			
When oxidizers are shifted to a second container, the container is labeled with the appropriate warning labels.			
Secondary containers are compatible with oxidizers.			
Oxidizers are stored away from heat sources where the maximum temperature exceeds 100 degrees F.			
Chromic acid, nitric acid, perchloric acid, potassium permanganate (all oxidizers) are stored separately from other corrosives and flammables.			

1. Applicability

This procedure applies to URS operations involving the use of hand tools and/or power equipment, including chain saws, brush cutters, powder-actuated tools, and similar high-hazard implements.

2. Purpose and Scope

The purpose of this standard is to provide guidelines for the safe use and handling of hand tools and power equipment.

3. Implementation

Office/Facility Locations - Implementation of this program is the responsibility of the Office Manager.

Field Locations - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. General

- 1. Keep hand and power tools in good repair and used only for the task for which they were designed.
- 2. Remove damaged or defective tools from service.
- 3. Keep surfaces and handles clean and free of excess oil to prevent slipping.
- 4. Do not carry sharp tools in pockets.
- 5. Clean tools and return to the toolbox or storage area upon completion of a job.
- 6. Wrenches must have a good bite before pressure is applied.
 - a. Brace yourself by placing your body in the proper position so that in case the tool slips you will not fall.
 - b. Make sure hands and fingers have sufficient clearance in the event the tool slips.

- c. Always pull on a wrench, never push.
- 7. When working with tools overhead, place tools in a holding receptacle or secure when not in use.
- 8. Do not throw tools from place to place, from person to person, or drop from heights.
- 9. Use non-sparking tools in atmospheres with fire or explosive characteristics.
- 10. Inspect all tools prior to start-up or use to identify any defects.
- 11. Powered hand tools should not be capable of being locked in the on position.
- 12. Require that all power fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
- 13. Do not allow loose clothing, long hair, loose jewelry, rings and chains to be worn while working with power tools.
- 14. Do not use cheater pipes.
- 15. Make provisions to prevent machines from automatically restarting upon restoration of power.

B. Grinding Tools

- 1. Inspect work rests and tongue guards for grinders.
 - a. Work rest gaps should not exceed 1/8 inch (3 mm).
 - b. Tongue guards gap should not exceed ¼ inch (6 mm).
- 2. Do not adjust work or tool rests while the grinding wheel is moving.
- 3. Inspect the grinding wheel for cracks, chips or defects. Remove from service if any defects are found.
- 4. Wear goggles when grinding. A clear full face shield may be worn with the goggles.

- 5. Do not use the side of a grinding wheel unless the wheel is designed for side grinding.
- 6. Always stand to the side of the blade, never directly behind it.
- 7. Use grinding wheels only at their rated speed.
- 8. Grinding aluminum is prohibited.
- 9. For U.K. operations:
 - a. No grinding wheels exceeding 55mm are to be used.
 - b. All wheels are to be marked with their safe maximum speed.
 - c. Abrasive wheels will only be operated by personnel who have been specifically trained and specified competent by URS.
 - d. Abrasive wheels will only be operated by persons specified as competent, under the 'Abrasive Wheels" Regulations.
 - e. Abrasive wheels must only be operated if the manufacturer's guard is fitted and they are in good working order.

C. Power Saws

- 1. Require that circular saws are fitted with blade guards.
- 2. Remove damaged, bent or cracked saw blades from service immediately.
- 3. Require that table saws are fitted with blade guards and a splitter to prevent the work from squeezing the blade and kicking back on the operator.
- 4. Require guards that cover the blade to the depth of the teeth on hand held circular saws. The guard should freely return to the fully closed position when withdrawn from the work surface.

D. Wood Working Machinery

- 1. Do not use compressed air to remove dust, chips and from wood working machinery.
- 2. Locate the on-off switch to prevent accidental start up. The operator must be able to shut off the machine without leaving the work station.
- 3. Guard planers and joiners to prevent contact with the blades.
- 4. Use a push stick when:
 - a. The cutting operation requires the hands of the operator to come close to the blade.
 - b. Small pieces are being machined.
- 5. Adjust saw blades so they only clear the top of the cut.
- 6. Automatic feed devices should be used whenever feasible.

E. Pneumatic Tools and Equipment .

- 1. Require that pneumatic tools have:
 - a. Tool retainers to prevent the tool from being ejected from the barrel during use.
 - b. Safety clip or tie wire to secure connections between tool/hose/compressor if they are of the quick connection (Chicago fittings) type.
- 2. Do not lay hose in walkways, on ladder or in any manner that presents a tripping hazard.
- 3. Never use compressed air to blow dirt from hands, face or clothing.
- 4. Compressed air exhausted through a chip guarded nozzle shall be reduced to less than 30 psi. Proper respiratory, hand, eye and ear protection must be worn.
- 5. Never raise or lower a tool by the air hose.

F. Powder Actuated Fastener Tools

- 1. Use powder actuated tools that comply with the requirements of the American National Standards Institute (ANSI) standard A 10.3 1970.
- Use only individuals that have been trained by a manufacturer's representative and possess the proper license to operate, repair, service and handle powder actuated tools.
- 3. Never use a powder actuated tool in a flammable or explosive atmosphere.
- 4. Require the use of goggles or a full face shield as well as safety glasses during operation of powder actuated tools.
- 5. Powder actuated tool must not be able to be fired unless the tool is pressed against the work surface.
- 6. The tool must not be able to fire if the tool is dropped when loaded.
- 7. Firing the tool should require two separate operations, with the firing movement being separate from the motion of bringing the tool to the firing position.
- 8. Never fire into soft substrate where there is potential for the fastener to penetrate and pass through, creating a flying projectile hazard.
- 9. Do not use powder actuated tools in reinforced concrete if there is the possibility of striking the re-bar.
- 10. Do not use on cast iron, glazed tile, surface hardened steel, glass block, live rock or face brick.
- 11. Never load and leave a powder actuated tool unattended. It should only be loaded prior to intended firing.
- 12. Test tools each day prior to loading by testing safety devices according to manufacturer's recommended procedure.

G. Chain Saws

- 1. Inspect the saw prior to each use and periodically during daily use.
- 2. Operate the chain saw with both hands at all times.
- 3. Never cut above chest height.
- 4. Require that the idle is correctly adjusted on the chain saw. The chain should not move when the saw is in the idle mode.
- 5. Start cutting only after a clear escape path has been made.
- 6. Shut the saw off when carrying through brush or on slippery surfaces. The saw may be carried no more than 50 feet (15 meters) while idling.
- 7. Require applicable protective gear. This may include, but is not limited to:
 - a. Loggers safety hat.
 - b. Safety glasses.
 - c. Steel-toed boots.
 - d. Protective leggings.
 - e. Hearing protection.
- 8. Inspect saws to require that they are fitted with an inertia break and hand guard.
- 9. Never operate a chain saw when fatiqued.
- 10. Do not allow others in the area when chain saws are operated.
- 11. Make sure there are no nails, wire or other imbedded material that can cause flying particles.
- 12. Do not operate a chain saw that is damaged, improperly adjusted, or is not completely and securely assembled. Always keep the teeth sharp and the chain tight. Worn chains should immediately be replaced.

- 13. Keep all parts of your body away from the saw chain when engine is running.
- 14. For U.K. operations, only personnel specifically trained and certified as competent by URS can operate chain saws.

H. Hand Operated Pressure Equipment

- Pressure equipment such as grease guns, paint and garden sprayers shall be directed away from the body and other personnel in the area. The person operating any equipment such as this, which has a potential for eye injury, must wear protective goggles.
- 2. The noise produced when using certain types of pressure equipment may require the use of hearing protection.
- 3. Never allow the nozzle of a pressurized tool to come in contact with any body parts while operating. There is potential for injection of a chemical directly into the user's body, resulting in severe injury or death.

Gasoline Powered Tools

- 1. Never pour gasoline on hot surfaces.
- 2. Never fuel around open flame or while smoking.
- 3. Shut down the engine before fueling.
- 4. Provide adequate ventilation when using in enclosed spaces.
- 5. Use only OSHA approved safety cans to transport flammable liquids.

J. Inspection

Inspect all hand tools on a regular basis. Defective tools shall be immediately removed from service, tagged or destroyed to prevent further use.

5. Documentation Summary

Place in the Project Safety File:

- A. Site briefings regarding tool use.
- B. Records of tools removed from service.
- C. Copies of powder actuated tool licenses (as applicable).
- D. Tool inspection documentation.

6. Resources

- A. U.S. OSHA Standard <u>Hand and Portable Power Tools</u> 29 CFR 1910, Subpart P
- B. U.S. OSHA Standard <u>Construction Tools Hand and Power 29 CFR 1926</u>, Subpart I
- C. ANSI A10.3 1970
- D. National Association of Demolition Contractors (http://www.demolitionassociation.com/)
- E. U.K. 'Abrasive Wheel' Regulations
- F. U.K. 'Wood-Working Machine' Regulations
- G. U.K. 'Provision and Use of Work Equipment' Regulations
- H. Australian Standards Collection 26 Occupational Health & Safety Powered Machining and Tools

1. Applicability

This standard applies to URS field operations involving the investigation or remediation of sites impacted with hazardous wastes or hazardous materials including those associated with underground storage tanks.

Investigation projects for real estate transactions conducted to confirm that a site is "clean" are not covered under this standard. Reference related <u>Safety</u> <u>Management Standards</u> for such operations.

2. Purpose and Scope

The purpose of this standard is to provide guidance designed to minimize hazardous chemical exposures to URS personnel while URS is conducting hazardous waste field operations.

Investigation techniques included under this standard include, but are not limited to, hand auger, soil gas evaluation, test pits, and all types of power drilling, including direct push. Remediation techniques included under this standard include, but are not limited to, excavation, groundwater treatment, soil gas treatment, containment, and landfarming and similar insitu methods.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager or Superintendent.

4. Requirements

A. Project Evaluation

Assess the technical and field aspects of every hazardous waste site project to evaluate:

- 1. Risk of exposure to hazardous chemicals, with particular attention to suspected or known human carcinogens.
- 2. Personal protective equipment requirements.
- 3. Air monitoring requirements.
- 4. Emergency services requirements.
- 5. Hazards addressed by other URS Safety Management Standards.

- 6. Logistical considerations, such as access, distance from population centers.
- 7. Other safety and health hazards associated with site operations.

B. Client/Contract Evaluation

- 1. Review contract documents to determine whether the client has any special internal or regulatory requirements for hazardous waste site operations.
- 2. Implement client requirements in addition to those of this standard. Those requirements that are the most protective (e.g., most stringent) will be used.

C. Site-specific Health and Safety Plan

- Prepare a site-specific Health and Safety Plan (HSP) for every project under this standard. HSPs must be written or reviewed by a URS Health and Safety Program Regional Health and Safety Manager.
- 2. Evaluate client and agency requirements prior to preparing the HSP, particularly if the client or an agency will approve the HSP prior to implementation.

D. Training

Verify that each assigned URS employee has completed required training. In general, the following are required for operations within North America:

- 1. 40-hours of initial training from an approved training provider.
- 2. 3-days of on-the-job training.
- 3. 8-hours of refresher training completed within 12 months of the initial or subsequent refresher training.
- 4. 8-hours of Site Safety Officer (Supervisor) training for directing the activities of any other URS employee.
- 5. Additional training for the Site Safety Officer as described below.

E. Site Safety Officer

- 1. Appoint a Site Safety Officer (SSO) with appropriate qualifications for the specific hazardous waste project.
- 2. Assure that the SSO for complex projects, such as those with complicated remediation activities, has no duties other than site safety and health.
- 3. Verify that the SSO has completed basic supervisor training, and has additional required training and experience as applicable:
 - a. Advanced respiratory protection training is required for projects where supplied air respirators may be used.
 - b. Heavy equipment/construction safety.
 - c. Personal air monitoring.

F. Exposure Monitoring

Require that exposure monitoring is conducted in accordance with the HSP on all hazardous waste projects.

G. Project Equipment

- 1. Provide all health and safety equipment as described by the project Health and Safety Plan.
- 2. Provide all personal protective equipment as described by the project Health and Safety Plan.

H. Medical Surveillance

Verify that each URS employee assigned to the project meets the minimum requirements of the URS Medical Surveillance Program. This typically includes:

- 1. Baseline examination.
- 2. Annual examination.
- 3. Appropriate clearance for respirator use.

5. Documentation Summary

In the Project Safety File:

- A. Completed Health and Safety Plan.
- B. Completed and signed HSP approval form.
- C. Signed HSP acceptance form.
- D. Completed H&S field forms that are included in each HSP.
- E. Training and Medical Surveillance Clearance documentation for project personnel.

6. Resources

A. U.S. OSHA Technical Links - Hazardous Waste Operations

The following documents are PDF files which must be read with Adobe Reader:

- B. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities NIOSH 85-115
- C. USACE EM 385-1-1 Hazardous, Toxic and Radioactive Waste

URS SAFETY MANAGEMENT STANDARD Heat Stress

1. Applicability

This procedure applies to URS field projects where ambient (not adjusted) temperatures exceed 70°F (21°C) for personnel wearing chemical protective clothing, including Tyvek coveralls, and 90°F (32°C) for personnel wearing normal work clothes.

2. Purpose and Scope

The purpose of this procedure is to protect project personnel from the effects of heat related illnesses.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

- A. Monitor ambient temperatures and conduct Heat Stress Monitoring when threshold temperatures (see Section 1) are reached.
- B. Conduct initial monitoring to determine first rest break.
 - 1. Measure the air temperature with a standard thermometer with the bulb shielded from radiant heat; this yields T (actual).
 - 2. Estimate the fraction of sunshine by judging what percent time the sun is not shielded by clouds that are thick enough to produce a shadow. 100 percent sunshine no cloud cover = 1.0; 50 percent sunshine 50 percent cloud cover = 0.5; 0 percent sunshine full cloud cover = 0.0.
 - 3. Plug these variables into the following equation to determine the adjusted temperature:

T (adjusted) = T (actual) + (13 x fraction sunshine)

- 4. Use <u>Attachment 18-1</u> to determine the length of the first work shift. At the first break, initiate the heart rate monitoring or body temperature monitoring as described below.
- C. Body Temperature Monitoring

URS SAFETY MANAGEMENT STANDARD Heat Stress

- Monitor oral body temperature to determine if employees are adequately dissipating heat buildup. Ear probe thermometers which are adjusted to oral temperature are convenient and the preferred method of measurement. Determine work/rest regimen as follows:
 - a. Measure (oral adjusted) temperature at the end of the work period.
 - b. If temperature exceeds 99.6 °F (37.5°C)., shorten the following work period by 1/3 without changing the rest period.
 - c. If temperature still exceeds 99.6 °F (37.5°C), shorten the following work period by 1/3.
 - d. Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6 °F (38.1 °C).
- Oral temperatures are to be obtained prior to the employee drinking water or other fluids.
- D. Record monitoring results on Heat Stress Monitoring Form (<u>Attachment</u> 18-2).
- E. Investigate the use of auxiliary cooling devices in extreme heat conditions.
- F. Conduct briefings for employees regarding health hazards and control measures associated with heat stress whenever conditions require the implementation of heat stress monitoring. Review the information provided in Attachment 18-3.
- G. Provide water and electrolyte replacement drinks fluids as described in <u>Attachment 18-3</u>.
- H. Allow employees who are not accustomed to working in hot environments appropriate time for acclimatization (see <u>Attachment 18-3</u>).
- I. Provide break areas as described in Attachment 18-3.

5. Documentation Summary

File these records in the Project Safety File.

URS SAFETY MANAGEMENT STANDARD Heat Stress

- A. Heat Stress Monitoring Forms.
- B. Employee Safety Briefing Verification Forms.

6. Resources

- A. NIOSH "Working in Hot Environments"
- B. AFL-CIO Building Trades Division "Heat Stress in Construction"
- C. Attachment 18-1 Initial Work Monitoring Cycles
- D. Attachment 18-2 Heat Stress Monitoring Record
- E. Attachment 18-3 -Informational Supplement

URS Corporation

URS Corporation Health & Safety Program EMPLOYEE HEAT STRESS EXPOSURE MONITORING RECORD

DATE:	SAFETY R	EPRESENTATIVE:	
WORKER'S NAME: WORK ACTIVITY:		SUBC	CONTRACTOR:
Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments
DATE:	SAFETY R	REPRESENTATIVE:	
		SUBG	CONTRACTOR:
Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments
DATE	CAFETY		
DATE:			CONTRACTOR:
Time (24 hour)	Oral Temp (°F)	Pulse (BPM)	Comments

Health and Safety Program HEAT STRESS INFORMATIONAL SUPPLEMENT

Attachment 18-3

HEAT RASH

Heat rash (prickly heat) may result from continuous exposure to heat or humid air. It appears as red papules (elevated skin lesion), usually in areas where the clothing is restrictive, and gives rise to a prickly sensation, particularly as sweating increases. It occurs in skin that is persistently wetted by unevaporated sweat. The papules may become infected unless treated.

First Aid for Heat Rash - to prevent heat rash: shower after work, dry off thoroughly, and put on clean, dry underwear and clothes. Try to stay in a cool place after work. If, in spite of this, you develop heat rash, see your physician.

HEAT CRAMPS

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:

- Muscle spasms.
- Pain in the hands, feet and abdomen.

First Aid for Heat Cramps - leave the work area, and rest in a cool, shaded place. Drink one or two glasses of electrolyte replacement drink, and try to gently massage the cramped muscle. Once the spasms disappear, you may return to work; taking adequate breaks and drinking electrolyte replacement drink should prevent the cramps from returning.

HEAT EXHAUSTION

Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin.
- Heavy sweating.
- Dizziness.
- Nausea.
- Fainting.

The key here is that the victim is still sweating, so the cooling system is still working; it's just under severe stress. The body core temperature may be elevated. It is important to

Health and Safety Program HEAT STRESS INFORMATIONAL SUPPLEMENT

Attachment 18-3

recognize and treat these symptoms as soon as possible, as the transition from heat exhaustion to the very hazardous heat stroke can be quite rapid.

First Aid for Heat Exhaustion - leave the work area immediately, go through decon and remove all chemical protective clothing. Rest in a cool, shaded place and open your clothing to allow air circulation; lay flat except when taking fluids. Drink plenty of cooled electrolyte replacement drinks. Your work is over for the day; do not attempt to return. Medical assistance in severe cases may be warranted.

HEAT STROKE

Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Signs and symptoms are:

- · Red, hot, usually dry skin.
- Lack of or reduced perspiration (lack of perspiration may be masked for those wearing chemical protective clothing since perspiration from earlier in the day will be present).
- Nausea.
- · Dizziness and confusion.
- · Strong, rapid pulse.
- Coma.

First Aid for Heat Stroke - THIS IS A MEDICAL EMERGENCY! SUMMON MEDICAL ASSISTANCE IMMEDIATELY! Remove the victim from the work area, perform a gross decon, and remove all PPE. Have the victim lie down in a cool, shady area. Attempt to bring the victim's temperature down by increasing air movement (electric fan) or placing wetted sheets or towels on them. Place an ice bag on the victim's head. The victim must not be sent home or left unattended without a physician's specific order.

HEAT STRESS PREVENTION

The best approach to avoiding heat-related illnesses is through preventative heat stress management. The site manager and site safety officer are responsible for implementing this program

Rest areas - a relatively cool, shaded area must be provided for breaks when ambient temperatures exceed 70° F and workers are wearing chemical protective clothing (including unceated Tyvek), or if temperatures exceed 90° F and workers are wearing "Level D"

Health and Safety Program HEAT STRESS INFORMATIONAL SUPPLEMENT

Attachment 18-3

coveralls or work clothes. A car or van is an oven, not a rest area. For Hazardous Waste Sites, the rest area should be located in the support zone adjacent to the contamination reduction zone, situated so that part of it is in the decon area so workers can take breaks without going through full decon. If shade is not available, build some: use a plastic "dining canopy", which can be obtained at sporting goods stores. This same type of canopy can be set up to shade personnel performing various types of work in hot weather.

Liquids - encourage employees to drink plenty of cool plain water and electrolyte replacement drinks. Supplementing water with cool electrolyte replacement drinks, such as Gatorade, Squench or Quik-kick (drink) is helpful to employees who tend to sweat a lot. Do not use "community cups"; use paper cups. Have workers drink 16 ounces of drink before beginning work, such as in the morning and after lunch. At each break, workers should take 8-16 ounces of drink. Don't wait until you are thirsty to drink.

Discourage the use of alcohol during non-working hours, and discourage the intake of coffee during work hours, as these make heat stress control more difficult.

Acclimatization - this is the process by which your body "gets used to" hot work environments. This is achieved by slowly increasing workloads. Start at 50 percent capacity on day one, and increase by 10 percent.per day; on day six, you'll be at 100 percent. You don't lose acclimatization over a weekend, but it'll start to decrease after three to four days. If you don't do hot work for a week, it is gone. You don't have to do full shift hot work to achieve or retain acclimatization; a minimum of 100 minutes of continuous hot work exposure per day is adequate.

Auxiliary Cooling - auxiliary cooling is usually obtained by providing workers with a specially-designed vest, which is worn under the protective clothing, but over any underclothing. These vests typically provide cooling via one of two methods: the use of ice or other frozen media, or the use of a vortex cooler. Each method has its advantages and disadvantages.

The frozen media vest requires a means for freezing the media, and the media (usually water or "blue ice") will melt, requiring replacement.

The vortex cooler tends to cool more uniformly. Instead of frozen media, this vest uses the expansion of compressed air to cool the wearer. The drawback is the compressed air requirement, but this is negated when the wearer is already using an airline respirator supplied by a compressor. A vortex cooler should not be supplied from air cylinders, as this will draw down the cylinders rapidly.

Auxiliary cooling should be considered when the following conditions exist:

- Ambient temperature over 80° F
- Workers wearing impermeable garments (PE Tyvek, Saranex, Chemrel, etc.)
- It is desirable to have long work shifts with minimum interruption

1. Applicability

This procedure applies to URS field projects where heavy equipment is in operation.

2. Purpose and Scope

The purpose of this procedure is to require that heavy equipment is operated in a safe manner, that the equipment is properly maintained and that ground personnel are protected.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Authorized Operators

- 1. Evaluate operators through documentable experience (resume) and a practical evaluation of skills.
- 2. Allow only qualified operators to operate equipment.
- 3. Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.
- 4. Maintain a list of operators for the project and the specific equipment that they are authorized to operate.
- Require operators to use seat belts at all times in all equipment and trucks.
- 6. Brief operators on the following rules of operation:
 - a. Operators are in control of their work area.
 - b. Equipment will be operated in a safe manner and within the constraints of the manufacturer's Operation Manual.
 - c. Operators will stop work whenever unauthorized ground personnel or equipment enter their work area and only resume work when the area has been cleared.

B. Ground Personnel

- 1. Require that ground personnel on the site have received training and comply with the following rules of engagement:
 - a. All ground personnel must wear orange protective vests when in work areas with any operating equipment.
 - b. Ground personnel will stay outside of the swing zone or work area of any operating equipment.
 - c. Ground personnel may only enter the swing or work area of any operating equipment when:
 - 1. They have attracted the operator's attention and made eye contact.
 - 2. The operator has idled the equipment down and grounded all extensions.
 - 3. The operator gives the ground personnel permission to approach.
 - d. Ground personnel shall never walk or position themselves between any fixed object and running equipment or between two running pieces of equipment.

C. Equipment

- 1. Maintain operations manuals at the site for each piece of equipment that is present on the site and in use.
- 2. Require that operators are familiar with the manual for the equipment and operate the equipment within the parameters of the manual.
- Require that all equipment is provided with roll-over protection systems (ROPS). Tracked excavators are exempt from ROPS requirements but must have a cab which provides protection from overhead hazards
- 4. Verify that seatbelts are present and functional in all equipment.

- 5. Prohibit the use of equipment which has cab glass which is cracked, broken or missing.
- 6. Require that backup alarms are functional on all trucks and equipment. Tracked excavators must have bidirectional alarms or the operator must be provided with a spotter whenever tracking in either direction.
- 7. Require all extensions such as buckets, blades, forks, etc. to be grounded when not in use.
- 8. Require brakes to be set and wheels chocked (when applicable) when not in use.
- D. Inspection and Maintenance
 - 1. Require daily inspections of equipment by operators using Attachment 19-1.
 - 2. Prohibit use of equipment deemed to be unsafe as a result of daily inspection until required repairs or maintenance occur.
 - 3. Conduct maintenance as prescribed by the manufacturer in the Operations Manuals for each piece of equipment.
 - 4. During maintenance/repair, require that:
 - a. Motors are turned off.
 - b. All extensions are grounded or securely blocked.
 - c. Controls are in a neutral position.
 - d. Brakes are set.

5. Documentation Summary

File the following documents in the Project Health and Safety File.

- A. List of authorized operators.
- B. Operator qualifications.
- C. Daily Equipment Inspection Logs.

D. Site Briefing documentation for opérator rules and ground personnel "rules of engagement".

6. Resources

- A. U.S. OSHA Standard <u>Motorized Vehicles and Mechanized Equipment</u> 29 CFR 1926, Subpart O
- B. National Association of Demolition Contractors Safety Manual (http://www.demolitionassociation.com/)
- C. Queensland Workplace Health and Safety Competency Standard for Users & Operators of Industrial Equipment
- D. Attachment 19-1 Equipment Inspection Form

Health and Safety Program DAILY HEAVY EQUIPMENT SAFETY INSPECTION CHECKLIST

Attachment 19-1

Equipment Id No.		Inspector's Name	
Equipment Name		Employee No.	
Beg. Hours	End Hours	Date	

INSTRUCTIONS: Each shift shall inspect all applicable items indicated. If an unsatisfactory condition is observed, suspend operation of the equipment and report the unsatisfactory condition to the site supervisor immediately.

ITEM INSPECTED	CHECK IF	COMMENTS
Falling Object Protective Structure (FOP)		
Roll-Over Protection Structure (ROP)		
Seat Belts		
Operator Seat Bar(s)		
Side Shields, Screens or Cab		
Lift Arm Device		
Grab Handles		
Back-up Alarm – Working		
Lights		
Guards		
Horn		
Anti-Skid Tread Clear of Mud		
Safety Signs (i.e., counterbalance swing area)		
Fire Extinguisher		
General Condition		
Fuel Connection		
Oil (fuel and no leaks)		
Clear of Extra Materials		
Controls Function Properly	·	
Damaged Parts		
Hydraulic System (full and no leaks)		
Parking Brake		
Lift Arm and Bucket		
Tires/Tracks		
Steering		
Breathing Air System		
Blast Shields		
Gallons of Fuel Added		
Quarts of Oil Added		

Operator Signature

D&MG SAFETY MANAGEMENT STANDARD

HOT WORK

1.0 Applicability

This procedure applies to D&MG projects involving welding, torch cutting, grinding, and other spark or heat producing operations.

2.0 Purpose and Scope

The purpose of this procedure is to establish safe hot work practices to reduce/eliminate personal injury and potential fire and explosion hazards.

3.0 Implementation

Field Activities - Implementation of this procedure is the responsibility of the

Project Manager.

Shop/Office- Implementation of this procedure is the responsibility of the

Location Manager.

4.0 Requirements

A. General

- 1. Verify that planned hot work operations conform to client hot work procedures and permit requirements.
- 2. Issue Hot Work Permit for all hot work operations where client permits are not provided. See Attachment 20-1.
- 3. Perform housekeeping in hot work areas to remove or cover all combustible or flammable materials.
- 4. Cover all wood planking, scaffolds, wooden forms, and other combustible material that cannot be removed with fire blankets or other suitable material.
- 5. Provide a fire watch when performing hot work in areas where fires might develop. Continue the watch for 30 minutes after completion of hot work.
- 6. Contain slag and sparks with fire blanket or sheet metal.

- 7. Require that at least one 10 pound BC fire extinguisher (U.K. 7 litre dry powder) is available at each hot work location.
- 8. Position weld screens or shields to protect workers and passers-by from welding arc rays.
- 9. Provide metal buckets or containers for disposal of electrode stubs.
- 10. Check for explosive vapors and, if necessary, purge before welding or cutting closed containers or pipelines.
- 11. Refer to SMS 10, "Confined Space Entry" for ventilation and other requirements for hot work in confined spaces.

B. Personal Protective Equipment

Require the provision and use of the following personal protective equipment for hot work operations:

- 1. Proper eye protection, e.g. welding hood with proper shade lens; cutting or burning goggles for torch cutting; full faceshields for grinding. See SMS 29, "Personal Protective Equipment" for proper lens shades.
- 2. Safety glasses must be worn under hoods and faceshields.
- 3. Appropriate gloves for task being performed.
- 4. Fire resistant welding jackets or leathers.
- 5. High top boots.
- 6. Clothing free of oil and grease, and preferably non-synthetic fiber.

C. Torch Cutting Operations

- 1. Inspect torches and hoses at the beginning of each shift for leaking shutoff valves, damaged hose and couplings, and tip connections.
- 2. Tag defective torches and remove from service until properly repaired.
- 3. Require that oxygen and fuel gas regulators and valves are in proper working order.
- 4. Light torches with strikers or other approved means, never with matches or lighters.

- 5. Keep oxygen cylinders and fittings free of oil and grease.
- 6. Require that oxygen and fuel gas hoses are easily distinguishable from each other and are not interchangeable. Do not use a single hose having more than one gas passage.
- 7. Provide flashback arrestors/check valves on all oxygen and fuel gas regulators.
- 8. Remove hose that shows evidence of flashback or damage from service and repair or discard.
- 9. Do not cover more than 4 inches out of 12 inches (10 cm out of 30 cm) of hose with tape when taping parallel lengths of hose to prevent tangling.
- 10. Use only hose couplings that cannot be unlocked or disconnected by means of a straight pull.
- 11. Require that the boxes used to store hose are ventilated.
- 12. String hoses overhead using non-metallic hangers or otherwise position them to keep clear of walkways, ladders, and stairways.
- 13. Provide proper ventilation and respiratory equipment when cutting zinc coated, cadmium coated, chromium bearing, mercury bearing, or other toxic material containing metals. See SMS 42, "Respiratory Protection".
- 14. Shut off cylinder valves and bleed regulators and hoses when leaving cutting rigs unattended and at the end of each shift.

D. Cylinder Handling

- 1. Secure cylinders in an upright position at all times.
- 2. Replace and secure valve safety caps when cylinders are not in use.
- 3. Close valves, remove regulators, and replace valve safety caps before moving cylinders.
- 4. Move cylinders by tilting and rolling them on their bottom edges; by use of a bottle cart; or with motorized equipment. Never lie cylinders on their sides and roll them.
- 5. Do not use magnets, chokers, or slings to hoist cylinders. Use a cradle or bottle rack designed and constructed for hoisting purposes.

- 6. Use only warm, not boiling, water to thaw cylinders and valves.
- 7. Provide bottle carts, chains, or other steadying devices to keep cylinders from being knocked over while in use.
- 8. Stencil, stamp, or label cylinders with either the chemical or trade name of the contents.

E. Cylinder Usage and Storage

- 1. Never use cylinders as rollers or supports, whether empty or full.
- 2. Do not attempt to refill or mix gases in a cylinder.
- 3. Require all cylinders to be equipped with a handle or wrench so that they can be turned off immediately if necessary.
- 4. Stand to the side of the outlet and open valve slightly and close immediately prior to connecting a regulator to a cylinder. Never crack a valve near ignition sources.
- 5. Position cylinders where they will not be struck by sparks, slag, or flame, and where they cannot become part of an electrical circuit.
- 6. Never take gas cylinders into confined spaces.
- 7. Do not strike an electrode against a cylinder to strike an arc.
- 8. Do not use hammers or wrenches to open cylinders having fixed hand wheels.
- 9. Do not use acetylene at a pressure in excess of 15 psi gauge pressure, or 30 psi absolute.
- 10. Store cylinders in a focation where they will not be subjected to sources of artificial heat.
- 11. Separate oxygen cylinders in storage from fuel gas cylinders and combustible materials by at least 20 feet (6.1 metres), or by a noncombustible barrier at least 5 feet (1.5 metres) high having a fire resistance rating of at least one-half hour.
- 12. Provide proper signs at storage areas, such as "DANGER FLAMMABLE No Smoking or Open Flames".

- Keep storage areas free of vegetation, trash, and other combustible materials.
- 14. Remove regulators and replace valve safety caps when storing cylinders or when cylinders will be left unattended.

F. Welding Operations

- 1. Use only electrode holders that are specifically designed for arc cutting and welding and are of a sufficient capacity to safely handle the maximum rated current required by the electrodes.
- 2. Require that electrode holders are properly insulated.
- 3. Remove electrodes from the holders and place holders so they cannot make contact with people or conducting objects when leaving holders unattended.
- 4. Require that the welding machine frame is properly grounded.
- 5. Shut off the welding machine at the end of each shift or when the machine is to be moved.
- 6. Require that the welding/cutting/ground cables meet the following requirements:
 - a) Cables must be completely insulated, flexible, and capable of handling the maximum current requirements of the work in progress.
 - b) Cables must be free from repair or splices for a minimum distance of 10 feet (3 metres) from the electrode holder, except when standard insulated connectors or splices with insulating value equal to the cable are used.
 - c) Insulated connectors of a capacity at least equal to that of the cable should be used for splices. If connecting lugs are used, they must be completely and substantially insulated.
 - d) A ground cable must have a safe current carrying capacity at least equal to the maximum output capacity of the unit or units that it services.
 - e) Never attach a ground cable to a pipeline containing gases or flammable liquids.
 - f) String all cables overhead with non-metallic hangers or otherwise position to keep clear of walkways, ladders, and stairways.
 - g) Immediately remove all damaged and worn cable from service until properly repaired.

5.0 Documentation Summary

File these documents in the Project Safety and Health file:

Hot Work Permits

6.0 Resources

- A. U.S. OSHA Construction Standard Welding and Cutting 29 CFR 1926, Subpart J
 - (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_J.html)
- B. U.S. OSHA Standard Welding, Cutting and Brazing 29 CFR 1910 Subpart Q (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1910_SUBPART_Q.html)
- C. ANSI Z49.1-1983, "Safety in Welding and Cutting" (http://web.ansi.org/public/std_info.html)
- D. U.K. 'Provision and Use of Work Equipment' Regulations
- E. U.K. 'Fire Precautions' Regulations
- F. U.K. 'Personal Protective Equipment for Use at Work' Regulations
- G. Australian Standards Collection 36 Welding (Safety)



CUTTING – WELDING – HOT WORK PERMIT

IMPORTANT: Precautions on reverse	e side must be followed without fail.
Date://	
Building:	
Floor/Dept./Area:	
Time Started:	_Completed:
	recautions listed on the reverse side have e been made for Item 5. Permission is
This permit expires	or end of shift, whichever is first.
If fire occurs, phone	or use alarm box located at
	Title
File in Project Safety and Health File.	See Reverse Side

DANGER

Do not cut, weld, or use other open flame or spark producing equipment until the following precautions have been taken.

Check each item:

	The location where work is to be done has been personally inspected.
	A. Sprinklers, where provided, are in commission.
	B. There is no flammable dust, vapors, or liquids, or unpurged tanks or equipment previously containing such materials in the area.
	C. This work will be confined to the area or equipment specified in the permit.
	2. The following safeguards have been provided:
	A. Floors and surroundings have been swept clean and wet down.
	B. Ample portable extinguishing equipment has been provided.
	If the work involves cutting, welding, or other spark producing equipment, the following additional safeguards have been provided:
	A. All combustibles have been located 30 feet from the operation and the remainder protected with fire blanket, metal guards, or flameproofed covers (not ordinary tarps).
	B. All floor and wall openings within 40 feet of the operations have been tightly covered.
	C. Firewatches have been assigned to watch for dangerous sparks in area, as well as floors above and below.
	 Flame or spark producing equipment to be used has been inspected and found in good repair.
	Arrangements have been made for a patrol of the area, including floors above and below, during any lunch or rest period and for at least one half hour after work has been completed.

URS SAFETY MANAGEMENT STANDARD Housekeeping

1. Applicability

This procedure applies to URS facilities and field operations.

2. Purpose and Scope

Proper housekeeping in office locations, on construction sites, and fixed work facilities is essential to prevent fires as well as injuries resulting from slips, trips and falls.

3. Implementation

Office Locations - Implementation of this program is the responsibility of the Office Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

- A. Maintain the cleanliness of the site.
 - 1. Require tools and equipment to be stowed at the end of the day.
 - 2. Store supplies in locations away from walkways and in a manner that will not trip workers.
 - 3. Keep weeds and vegetation away from stockpiled materials and walkways.
 - 4. Maintain flooring and walkways in a clean, dry, smooth condition.
 - 5. Dispose of construction debris in a timely manner.
- B. Regularly inspect the work area for slip and trip hazards.
 - 1. Office locations inspect work areas at least semi-annually. Utilize the check-sheet provided as <u>Attachment 21-1</u>.
 - 2. Field sites inspect sites at least monthly. Utilize the check- sheet provided as <u>Attachment 21-1</u>.
- C. Thoroughly investigate all injuries resulting from slips, trips and falls on site. Correct conditions contributing to injuries.

URS SAFETY MANAGEMENT STANDARD Housekeeping

5. Documentation Summary

A. Office/Laboratory

File Completed Housekeeping Inspection Sheets (<u>Attachment 21-1</u>), in the Office Safety Filing System.

B. Field

File Completed Housekeeping Inspection Sheets (<u>Attachment 21-1</u>), in the Project Safety File.

6. Resources

- A. U.S. OSHA Standard Sanitation 29 CFR 1910.141
- B. U.S. OSHA Standard Aisles and Passageways 29 CFR 1910.22.
- C. U.K. 'The Workplace' (Health & Safety and Welfare) Regulations
- D. U.K. 'The Construction' (Health and Welfare) Regulations
- E. Attachment 21-1 Housekeeping Inspection Sheet

D&MG SAFETY MANAGEMENT STANDARD LEAD IN CONSTRUCTION

1.0 Applicability

This procedure applies to D&MG projects where lead-containing materials are disturbed and occupational exposures may occur.

2.0 Purpose and Scope

The purpose of this program is to protect personnel from occupational exposures to lead.

3.0 Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

- A. Determine whether any surface to be disturbed or altered contains lead or has a surface coating that contains lead.
- B. All employees potentially exposed to lead must:
 - 1. Be in the Division's Medical Surveillance Program for Lead.
 - 2. Have received training as outlined in Attachment 22-1.

C. Interim Protection Measures

Until the initial exposure assessment can be conducted the following protective measures must be implemented:

- 1. Provide respiratory protection as outlined in Attachment 22-2.
- 2. Provide coveralls or other similar full body covering.
- 3. Provide gloves, hats, shoes or disposable shoe coverings.
- 4. Provide faceshields, goggles or other appropriate protective equipment.
- 5. Provide change areas and handwashing facilities.

D. Initial Exposure Assessment

- 1. Contact D&MG Health and Safety Program Representative to determine whether historical air monitoring data is available that accurately represents exposure conditions for the Initial Determination for the project.
- 2. In the absence of representative historical data conduct air monitoring in accordance with SMS 43, "Personal Monitoring".
- E. Negative Initial Determination
 - 1. Exposures to lead below an 8-hour time-weighted average of $30\mu g/m^3$ requires a written record which includes:
 - a) Date of determination.
 - b) Location within the worksite.
 - c) Name of each employee monitored.
 - d) Monitoring results.
 - e) Type of activity conducting during monitoring.
 - 2. No further action regarding lead required.
- F. Exposures to lead above an 8-hour time-weighted average of $30\mu g/m^3$ and below $50\mu g/m^3$

All employees potentially exposed to lead must:

- 1. Be in the Division's Medical Surveillance Program for Lead.
- 2. Have received training as outlined in Attachment 22-1.
- 3. Utilize appropriate PPE and personal hygiene procedures as outlined in the project-specific safety plan.
- G. Exposures above the 8-hour time-weighted average Permissible Exposure Limit of $50\mu g/m^3$
 - 1. Develop a Lead Compliance Plan
 - a) The compliance plan must include the following topics:
 - (1) Description of work activities that expose personnel to lead.
 - (2) Equipment to be used and procedures to be followed during lead exposure activities.
 - (3) Employee job responsibility and crew size during lead exposure activities.

- (4) Maintenance practices to be followed for servicing and cleaning equipment and disposing of waste.
- (5) Specific instructions on how to set up engineering controls (ventilation; containment; etc.).
- (6) Air monitoring data from initial assessment.
- (7) A detailed work schedule for implementation.
- (8) A description of arrangements made among contractors on multicontractor sites with respect to informing affected employees of potential exposure to lead.
- (9) The name of the competent person for the site.
- b) Appoint a Competent Person who will be responsible for performing regular inspections of the job site, materials, and equipment during the job.
- 2. Order the PPE specified in the Lead Compliance Plan.
- 3. Provide for the cleaning, laundering, and disposal of protective clothing and equipment.
- 4. Notify the D&MG Health and Safety Program Representative whenever there is a change in the lead job that has not been addressed by the Lead Compliance Plan.
- H. Require that Engineering Controls are on site and installed correctly before work begins. Implement the engineering controls specified in the Lead Compliance Plan for the site.
- I. Provide hygiene facilities which include:
 - 1. A clean change room equipped with separate lockers for the storage of street clothes and work clothes.
 - 2. A shower and handwashing facilities.
 - 3. A lunch area free from lead contamination.

- J. Establish rules that will maintain proper housekeeping in the lead abatement area, specifically:
 - 1. Prohibit contaminated clothing and equipment outside of lead work area.
 - 2. Require lead workers to shower at the end of the shift and wash up before eating and drinking outside the lead area.
 - 3. Segregate dirty or contaminated equipment from clean work areas.
 - 4. HEPA vacuum all lead-contaminated surfaces.
- K. Label lead hazardous areas and equipment.
 - 1. Mark lead hazardous areas with boundary tape and signs stating:

WARNING LEAD WORK AREA POISON NO SMOKING OR EATING

- 2. Mark lead contaminated equipment and debris with labels warning of the lead hazard.
- L. Notify contractors and subcontractors before work begins.

Require contractors to know the location of lead in the job site. Even if contract workers are not directly exposed they may need to still perform training required under the hazard communication standard.

M. Maintain requirements of the Lead Compliance Plan throughout the job.

Direct the appointed "competent person" to inspect the job site at least daily for those days when lead operations are performed.

5.0 Documentation Summary

File these records in the Project Safety File:

- 1. Physician's medical clearance for lead workers.
- 2. Proof of blood lead testing for personnel.
- 3. Pre-Job Lead Hazard Initial Assessment.

- 4. Air monitoring results.
- 5. Completed Lead Job Inspection forms.
- 6. Lead Compliance Plan for the job (as necessary).

6.0 Resources

- A. U.S. OSHA Standard Lead 29 CFR 1926.62 (http://www.osha-slc.gov/OshStd_data/1926_0062.html)
- B. U.S. OSHA Expert System Lead in Construction Advisor (http://www.osha.gov/oshasoft/LeadxWb.html)
- C. U.S. OSHA Technical Links Lead (http://www.osha-slc.gov/SLTC/lead/index.html)
- D. U.K. 'Lead at Work' Regulations
- E. Australian Standards AS4361.1-1995 and AS4361.1-1998. Guide to Lead Paint Management
- F. Queensland Workplace Health and Safety Lead at Work (http://www.detir.qld.gov.au/hs/brochure/bro003.pdf)



D&MG Health & Safety Program TRAINING REQUIREMENTS FOR LEAD WORKERS

Assure each employee is trained in the following:

- a) The content of lead in construction standard, (29 CFR 1926.62 for U.S. operations).
- b) The specific nature of the operations that could result in exposure to lead above the action level.
- c) The purpose, proper selection, fitting, use, and limitations of respirators.
- d) The purpose and description of the medical surveillance program and the medical removal protection program including information concerning the adverse health effects associated with excessive exposure to lead.
- e) The engineering controls and work practices associated with the employee's job assignment including training of employees to follow relevant good work practices.
- f) The content of any lead compliance plan and the location of regulated areas in effect.
- q) Instructions to employees that chelating agents should not be routinely used.
- h) The employee's right of access to records.

11



D&MG Health & Safety Program INTERIM RESPIRATORY PROTECTION MEASURES

During the interim work period while air monitoring is being performed and exposure levels are being determined, the following guidance must be followed regarding respiratory protection for employees:

- 1. Provide half face respirators with HEPA cartridges where lead coatings or paint is present and any of the following activities will occur:
 - a) Manual demolition of structures.
 - b) Manual scraping.
 - c) Manual sanding.
 - d) Heat gun applications.
 - e) Power tool cleaning with dust collection applications.
 - f) Spray painting with lead paint.
- 2. Provide Loose fitting hood or helmet powered air purifying respirator with high efficiency filters, or hood or helmet supplied air respirator operated in a continuous-flow mode when performing tasks involving:
 - a) Lead containing mortar.
 - b) Lead burning.
 - c) Rivet busting.
 - d) Power tool cleaning without dust collection systems.
 - e) Cleanup activities where dry expendable abrasives are used.
 - f) Abrasive blasting enclosure movement and removal.
- 3. Provide full facepiece supplied air respirator operated in pressure demand or other positive-pressure when performing tasks involving:
 - a) Abrasive blasting.
 - b) Welding.
 - c) Cutting.
 - d) Torch burning!

D&MG SAFETY MANAGEMENT STANDARD LOCKOUT AND TAGOUT SAFETY

1.0 Applicability

This procedure applies to D&MG projects involving exposure to uncontrolled sources of energy.

2.0 Purpose and Scope

This procedure outlines the requirements that must be followed to prevent injuries, either direct or indirect, when work is performed near or on an energy source that is unexpectedly operated.

Some energy sources that should be protected against include:

- A. Electrical circuits.
- B. Fluid systems (water and liquid product).
- C. Pneumatic systems.
- D. Flammable systems (including liquid and gaseous fuels).
- E. Thermal systems (steam).
- F. Gravity systems.
- G. Hazardous material systems.

3.0 Implementation

Field Operations - Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

A. General

1. "Authorized employee" means a person who locks/tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment, and who has received the training described in Section C, below.

- "Affected employee" means an employee whose job requires him/her to
 operate or use a machine or equipment on which servicing or maintenance
 is being performed under lockout and tagout, or whose job requires him/her
 to work in an area in which such servicing or maintenance is being
 performed.
- 3. "Qualified person" means person who is familiar with the construction and operation of the equipment and the hazards involved, and who:
 - a) Requests de-energizing of an energy source.
 - b) Inspects de-energizing with the authorized employee.
 - c) Assures that authorized employee has locked and tagged the source.
 - d) Requires that all applicable authorized employees affix lock/tags at the same locations(s).
 - e) Operates the equipment controls or otherwise verifies that the equipment cannot be restarted after being locked out.
 - f) Coordinates the continuation of lock/tagout protection through shift or personnel changes.
 - g) Controls accountability of locks and tags.
 - h) Makes appropriate log entries on Attachment 23-1.
 - i) Conducts tests and visual inspections prior to reenergizing to check that circuits and equipment can be safely energized.
- 4. Employees shall not work on or in equipment, vessels, etc., which are <u>not</u> in a "zero energy state".
- 5. Coordinate all lockout and energy control activities with client, owner, contractor, and subcontractor practices and programs.
- 6. Require that all locks are keyed differently and that only one key exists for each lock and remains in the possession of the authorized employee to whom it has been assigned.

B. Procedure

Follow this lock and tagout procedure whenever the unexpected operation of equipment, switch, or valve or other energy sources could injure someone. Only authorized employees may perform jobs requiring lockout procedures.

- 1. Step 1 Achieving Zero Energy
 - a) Identify and locate all sources of energy that could affect individuals involved.
 - b) Notify all affected personnel that equipment is going to be de-energized and accessed. This can be done verbally, visually, or by hanging a warning tag on the control panel.

- c) Disconnect the main sources of power by breaking the primary power circuit, valve, pipe, etc. Locking out a low voltage control circuit is not considered breaking a main power source.
- d) Disconnect each separate power source of multiple power systems, e.g., air over hydraulic, electric over hydraulic, etc.
- e) Release all residual energy remaining behind the power source, e.g., hydraulic or air pressure, etc.
- f) Secure all power sources in the de-energized position with a lockout device. Use multiple lock devices when more than one lock is required. Each person who is protected by the lockout:
 - (1) Places a signed lock and tag on source location(s).
 - (2) Keeps the key to his/her own lock.
 - (3) Removes own lock (only exception: person not on site and person is contacted).
 - (4) Works only on protected source(s).
 - (5) Removes lock at completion for work shift or transfer.
- g) Block or blank any machinery, device, or piping system that can move on its own or deliver energy with or without the power source.
- h) Test equipment, prior to working on it, to insure that all sources of energy have been isolated and that it is "safe".

2. Step 2 - Preparing to Re-Energize

- a) Once the task has been completed, tools picked up, safety chains, guards, guard rails, warning signs, etc. are replaced, notify affected personnel that the lockout device is going to be removed.
- b) Remove locks and tags.
- c) Once all lockout devices have been removed, the equipment or process may be restarted.
- 3. Temporary operation of locked out source
 - a) Make sure everyone is clear of the system.
 - b) Make sure tools are clear.
 - c) Remove lock(s).
 - d) Energize the system and conduct check.
 - e) Immediately de-energize the system and replace locks.
- 4. Unauthorized removal of lock and tag is prohibited. Use the following procedure for Supervisor or Qualified Person to remove lock/tag when employee is not available:
 - a) Verify authorized employee is not on site and available to remove own tag.

- b) Check that employees are not exposed to hazards.
- c) Verify equipment is safe to operate, tools have been removed and guards have been replaced.
- d) Remain with affected equipment so that no one returns while equipment or process is being restarted.
- e) Remove lock/tag and energize equipment.
- f) Require that affected employee knows the lockout device(s) has been removed before he/she resumes work.

C. Training

- 1. Authorized employees must receive training prior to conducting lockout/tagout activities.
- 2. Training must include:
 - a) Purpose of lockout procedure.
 - b) Hazards associated with different energy sources.
 - c) Recognition of when to lockout.
 - d) Electrical lockout procedures.
 - e) Valve lockout procedures.
 - f) Compliance with lockout procedures.
 - g) Discussion of specific procedures.

5.0 Documentation Summary

File these records in the Project Safety File:

- A. Training records for authorized employees
- B. Lockout Log

6.0 Resources

- A. ANSI 235.2
 - (http://www.ansi.org)
- B. U.S. OSHA Standard Accident Prevention Tags and Signs 29 CFR 1926.200 (http://www.osha-slc.gov/OshStd_data/1926_0200.html)
- C. U.S. OSHA Standard Locking and Tagging of Circuits 29 CFR 1926.417 (http://www.osha-slc.gov/OshStd_data/1926_0417.html)
- D. U.S. OSHA Technical Links Lockout/Tagout (http://www.osha-slc.gov/SLTC/controlhazardousenergy/index.html)



D&MG Health and Safety Program LOCK AND TAG LOG

Job Name:	Job Location									
		Date:								
Date.	ece LockoutsLocation	Authorized Employee	Activity:	Activity. Completed,						
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1. Applicability

This program applies to employees assigned to work environments where there is a potential for exposure to chemical, biological, and/or physical hazards. Individuals will be selected for medical screening based on regulatory standards, project health and safety plan assessments, the expected use of personal protective equipment, and client contract requirements.

2. Purpose and Scope

The overall goal of this program is to prevent occupational illness and injury by early identification of exposure-related health effects before they result in disease. Medical examinations will be performed in order to determine if employees are capable of safely performing assigned tasks, to verify protective equipment and controls are effectively providing protection, and to comply with governmental regulations. Included are provisions for emergency medical consultation and treatment.

3. Implementation

Office/laboratory locations – Implementation is the responsibility of the Office Manager.

Field activities - Implementation is the responsibility of the Project Manager.

Program Administration — The Occupational Health Specialist (OHS) is responsible for development and administration of this program in coordination with the URS Medical Service Provider (MSP). The OHS will maintain current injury and illness data and participate with Corporate Health & Safety Managers in evaluation of this program. The MSP will provide board certified occupational medicine oversight for the program and will approve medical surveillance protocols.

The United States and Canada locations will follow all requirements of this program.

International locations will follow sections B.1,2,3,5,6,7,8; G.3; and H.1 of this program.

4. Requirements

A. Selection of program participants.

- 1. The Medical Surveillance Evaluation (MSE) form (<u>Attachment 24-2</u>) provides the primary guidance for determining whether medical screening is required for an employee and the frequency of periodic exams. The MSE is to be completed by the employee and their supervisor at time of hire for any employee who may work outside an office environment and is to be reviewed for accuracy at each annual performance review. Other reviews are required whenever there is a change in job tasks.
- 2. Additional site/project specific biological monitoring or toxicological screening may be required in addition to this program's core exam schedule. These medical tests will be specified by the project-specific health and safety plan and will be authorized by the MSP on the exam appointment protocol. Note: See section D.2 if employee will have an initial assignment at a HAZWOPER site.
- B. Types of medical screening and surveillance exams
 - 1. A baseline or preassignment baseline exam will be conducted prior to the start of work assignments requiring medical surveillance.
 - 2. Periodic exam schedules are established by the MSP using the following criteria:
 - a. Employees performing the following types of work will receive annual exams: construction activities in the exclusion zone of HAZWOPER sites, field work activities in the exclusion zone of HAZWOPER sites for 30 or more days per year, projects involving exposure to OSHA-regulated materials at or above established action levels.
 - b. Employees performing the following types of work will receive biennial exams: wet chemistry laboratory for 30 or more days per year, pilot plant projects, bench scale operations, waste disposal activities, field work activities at HAZWOPER sites less than 30 days per year.
 - 3. Employees currently participating in an examination program will receive exit exams when they leave their work assignment as identified in the Exit Exam Determination (Attachment 24-6). In the event an employee declines the exit exam, the employee will be requested to sign a Waiver of Exit Medical Surveillance Exam (Attachment 24-7).

- 4. Department of Transportation (DOT) exams will be conducted biennially when an employee is assigned to drive a vehicle with a gross weight rating of more than 10,000 pounds or when driving a placarded vehicle of any size used to transport hazardous chemicals. DOT exam certification can be added to a routine baseline or periodic exam protocol when scheduling with the MSP.
- 5. When noise levels in the employee's work environment equal or exceed an 8-hour time-weighted average of 85 decibels as measured on the A-scale (dBA), annual audiograms will be performed. For employees involved in construction activities or management of construction, enrollment in this program will be required if more than 50% of their time is spent in an active construction area.
- 6. Individual radiation dose monitoring will be conducted as required by the site-specific health and safety plan with approval by a Radiation Safety Officer. Personal dosimetry (film badges) are typically required, however, depending on the specific radiation hazard, additional excretory monitoring or thyroid scans may be required.
- 7. In order to determine an employee's ability to wear a respirator, a rnedical evaluation will be performed before an employee is fit tested or assigned to wear a respirator.
- 8. Employees assigned to work environments with airborne concentrations of asbestos fibers at or above the established action level will receive asbestos-specific baseline and annual exams. Exit exams will be performed if an exam has not been performed within the past 6 month period or if an employee has medical complaints related to asbestos exposure.

C. Exam protocols

1. The Medical Screening & Surveillance Exam Protocol (<u>Attachment</u> 24-3) identifies the medical exam components of this program.

D. Scheduling of exams

 The Office or Project Manager, usually with assistance of the local H&S Representative, is responsible for contacting the MSP when baseline, exit, and project specific exams are required. The MSP maintains an employee scheduling database for tracking periodic

exams and will contact the employee for scheduling the month their exam is due. These steps are detailed in the Medical Surveillance Exam Process (Attachment 24-4).

- 2. Construction Services Division employees hired with an initial assignment to work at a OSHA HAZWOPER site whose work duties require passing a physical exam or who have an essential job function of wearing a respirator, will receive a job offer contingent upon passing a preassignment baseline exam. See HAZWOPER & Respirator Preassignment Baseline Exam Process (Attachment 24-5). In the event of an urgent business necessity a temporary clearance to begin work the day of the exam, issued by the local physician and good for 14 days until the MSP physician final clearance is received, may be requested at the time a baseline exam is scheduled through the MSP.
- 3. If an exam becomes due during an employee's pregnancy, it is advised to defer the exam until after delivery and the employee returns to work from family/medical leave status.

E. Exam Follow Up

- 1. Following each exam, the MSP will issue a physician's written opinion (Health Status Medical Report) to the site Health & Safety Representative which will include any medical restrictions and address the employee's ability to use personal protective equipment. See Exam Follow Up Procedures (Attachment 24-8).
- 2. The MSP will mail the exam invoice to the site H&SR who will approve the charge and forward the invoice to the accounts payable department for payment.
- 3. The MSP will mail an exam results letter that is confidentially addressed to the employee at their home address within 30 days of the exam date.

F. Emergency Medical Care

 Preplanning is essential to a prompt and proper response to a medical emergency. Site specific emergency procedures will be provided in the site Health & Safety Plan. See Field First Aid Kit Supply List (<u>Attachment 24-9</u>) for recommended supplies. The contents of the first aid kit shall be checked prior to being sent out

to each site/project and periodically thereafter to ensure the expended items are replaced.

- 2. A MSP occupational physician can be reached 24 hours a day for phone consultation at 1-800-455-6155.
- 3. A workers' compensation claim should be filed by the Human Resource Representative with St. Paul Fire and Marine Insurance (1-800-787-2851) for an injured employee who receives professional medical care or who is disabled from working beyond the initial date of injury.
- 4. In order to comply with OSHA reporting regulations, immediately notify the OHS or a Division Health & Safety Manager if there is a work-related hospitalization or death.

G. Medical Records

- Medical records are maintained and preserved in confidential, locked files in the custody of the MSP for at least the duration of employment plus 30 years. Only information regarding the employee's ability to perform the job assignment will be provided to company representatives.
- Upon request, each employee (or designated representative) will have access to the employee's medical record. Prior to the release of health information to the employee (or designated representative), a specific written consent must be signed by the employee.
- 3. International records (excluding the United States and Canada) will be maintained in country at the local clinic.

H. Program evaluation

- The OHS and Division Health & Safety Managers will evaluate this
 program annually and as needed. Issues to review include
 program efficacy and efficiency, employee satisfaction, and cost
 effectiveness.
- 2. The MSP will prepare an Annual Medical Trending Report specifying the number and types of exams performed and anonymous statistical exam results in group data format.

3. Each employee is mailed a Post-Exam Evaluation by the MSP. Employee feedback regarding the clinic, medical staff, and exam procedures are reviewed and corrective actions are identified and acted upon as needed.

5. Documentation Summary

The H&SR will file the Medical Surveillance Evaluation (Attachment 24-2) and the Health Status Medical Report in the site health & safety records.

6. Resources

Α.	U.S. OSHA	Technical Links	- Medical	Screening/Surveillance
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B.	U.S. OSHA Publication 3162 (1999) Screening and Surveillance: A	١
	Guide to OSHA Standards	

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C.	Attachment 24	<u>4-1</u>	WorkCare Medical History Questionnaire
D.	Attachment 24	4-2	Medical Surveillance Evaluation
E.	Attachment 24	<u>4-3</u>	Medical Screening & Surveillance Exam Protocol
F.	Attachment 24	4-4	Medical Surveillance Exam Process
G.	Attachment 2- Exam Proces		HAZWOPER/Respirator Preassignment Baseline
H.	Attachment 2	<u>4-6</u>	Exit Exam Determination
l.	Attachment 2	4-7	Waiver of Exit Medical Surveillance Exam
J.	Attachment 2	4-8	Exam Follow Up Procedures
K.	Attachment 2	4-9	Field First Aid Kit Supply List
L.	SMS 8	Asbes	stos Survey and Oversight Operations
M.	SMS 17	Hazaı	dous Waste Operations
N.	SMS 42	Respi	ratory Protection

Medical History Questionnaire Baseline Annual/Biennial Company Name: Office: Date:



Medical History Questionnaire

The exam will be at: Please see Appointment Protocol.

- Please have your Supervisor or Health & Safety Professional complete the Job Profile on the inside flap of this page if you do not know the responses.
- See your Health & Safety Professional for directions to the clinic. Please bring the completed exam packet and your Authorization.
- Do not eat for 8 hours prior to exam. (Water and unsweetened juice or black decaffeinated coffee are allowed) (Dry toast if you have an afternoon appointment)
- Avoid all alcohol consumption for 24 hours prior to the exam.
- Avoid loud noise exposure for 14 to 16 hours before the exam.
- If you wear contact lenses, please do not insert them on the day of the exam. Bring a pair of glasses.
- If you use hearing aids, please bring them to the clinic.
- If you have questions, do not read or understand please contact (800) 455-6155.
- The cost of this exam will be borne by your employer. It is important to be on time for your appointment. If you cannot attend your appointment, call (800) 455-6155 to cancel, or your employer may be charged.

Please answer all the questions in this booklet.

Occupational Medicine • Environmental Health • Toxicology

1-(800) 455-6155

1				INSTRUCT	rions						
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WOR	KSCHE	DULE		% Field % C	Office	% Travel					

PF	ROTEC	TIVE EQUIPMENT				Yes	N
ls	clearar	nce for the use of respiratory protective equipme	ent needed?				
Es	scape c	only (no rescue) 🗆 Emergency rescue o	only 🗆				
		pecific safety equipment (beyond hard hat, glover performance on the job? If yes please specify		ppropriate clot	hing) that are used	Yes	N
1.		THIS EMPLOYEE USES THE FOLLOWING	TYPES OF RESP	IRATORY PR		MENT:	
	/		DURATION	FREQUENCY	TEMPERATURE EXTREMES	НОМІДП	Υ
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		FULL FACE PIECE AIR PUIRFYING RESPIRATOR					
		POWERED AIR PURIFYING REPIRATOR					
	-	SELF-CONTAINED BREATHING APPARATUS					
		AIR LINE RESPIRATOR					
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REVIEW OF SYSTEMS

ANSWER YES IF YOU CURRENTLY HAVE THE SYMPTOM OR HAVE HAD SIGNIFICANTLY IN THE PAST

2.	A. Fever B. Chills C. Weight Loss D. Loss of energy/fatigue A. Poor Vision B. Color Blindness C. Double vision D. Injury to eye E. Cataract			
	C. Weight Loss D. Loss of energy/fatigue A. Poor Vision B. Color Blindness C. Double vision D. Injury to eye			
	D. Loss of energy/fatigue A. Poor Vision B. Color Blindness C. Double vision D. Injury to eye			
	A. Poor Vision B. Color Blindness C. Double vision D. Injury to eye			
	A. Poor Vision B. Color Blindness C. Double vision D. Injury to eye			
	B. Color Blindness C. Double vision D. Injury to eye			
3.	C. Double vision D. Injury to eye			I
3.	D. Injury to eye			
3.				
3.				-
3.	F. Glaucoma	+		
3.				
3.	G. Do you wear glasses or contacts?			
	A. Ear Infection			ļ .
	B. Mastoid surgery	—		
	C. Loss of hearing		ļ	ļ
	D. Sore throat			
	E. Frequent hoarseness			1
	F. Dental problems		ļ	
4.	A. Allergies			<u> </u>
	B. Sinus trouble			1
	C. Hay fever			1
5.	A. Tuberculosis		l	
	B. Asthma & breathing difficulties			
	C. Lung collapse			
	D. Pneumonia			
	E. Shortness of breath		†	1
	F. Persistent or severe colds		t	1
	G. Persistent or severe coughs	- T	1	† · · ·
	H. Chest surgery		f	
	I. Wheezing		t	†
	J. Emphysema		 	†
	K. Bronchitis		 	+
6.	A. High blood pressure	 -	 -	+
о.	B. Heart murmur		 	+
	C. Enlarged heart		}	+
	D. Heart disease/failure		+-	+
			┼──	
	E. Rheumatic fever		├	
	F. Heart palpitations			+
	G. Irregular heart beat		_	
	H. Heart attack		ļ	1
	I. Chest pain		 	
7.	A. Varicose veins		ļ	ļ
	B. Stroke		↓	1
	C. Leg ulcers		.	
	D. Swelling of ankles			
	E. Leg pain on walking			
В.	A. Anemia		I	
	B. Leukemia		I	
	C. Sickle Cell Disease			
	D. Other blood disease		1	1
9.	A. Diabetes			T
	B. Thyroid problems		†	1
	C. Cancer or tumors		†	1
	D. Heart related illness	-	 	+
10.	A. Rash/dermatitis		1	+
10.	B. Bruise easily	+	+	+
	C. Psoriasis	+-		+
			+	+
	D. Wart/mole change E. Eczema/Acne			

I1. A. Headaches B. Head Injury C. Neck Injury		\top		YES	NO	DATE
B. Head Injury C. Neck Injury C. Neck Injury C. Neck Injury C. Neck Injury B. Birth defect B. Frequent backaches C. Back surgery D. Disc disease E. Back injury or strain F. Back xrays G. Chiropractic treatments H. Arthritis/Rheumatism I. Knee problems J. Swollen joints K. Amputation L. Broken Bones Type: M. Dislocations N. Carpal Tunnel Syndrome Q. Repetitive Strain Extremities A. Ucers B. Colitis C. Diarrhaa (frequent) D. Stomach problems E. Vom ting F. Bloody bowel movements G. Hopatitis/Abnormal liver enzymes H. Cirrhosis I. Yellow Jaundice J. Gallbladder trouble C. Loss of consciousness D. Dizziness or vertigo E. Frequent exhaustion F. Trouble with nerves G. Frequent exhaustion F. Trouble with nerves B. Bladder trouble C. Köney/Disdadder surgery D. Blood in urine E. Difficulty urinating C. Au Avenreal disease B. Infertility/difficulty conceiving C. Chicren with birth defects B. Hysterectomy C. Are you pregnant? D. Have you difficulty becoming pregnant? E. Date of last menstrual period B. Discharge J. Repeated miscarriages J. Repeated miscarriages J. Broast discharge J. Repeated miscarriages J. Bloscharge or bleeding from the pens	11	\dashv	A Handashaa			
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Describe fully any "Yes" responses by number:	
Are you currently unable to perform any type of activity? Yes 🗆	No 🗆 List:

2. Have you ever smoked cigarettes in the past?	
2. Have you ever smoked cigarettes in the past?	OR OHESTIONS 7.0. CHOOSE THE ANSWER
2. Have you ever smoked digarentes in the past?	OR QUESTIONS 7-9, CHOOSE THE ANSWER HICH BEST FITS YOU.
	If yes, how many drinks, beers or glasses of wine
	do you drink daily?
many years total have you smoked? (Write in number)	☐ Less than 1 ☐ 1-2 ☐ 3-4
4. If you now smoke or have smoked in the past,	☐ 5-6 ☐ 7-8 ☐ More than 8 Do you have strenuous exercise for at least 45 min.
now many packs per day dordid you smoke our the	☐ Daily ☐ 3 times a week ☐ 1 time a week
average? (Choose the closest number)	☐ Rarely ☐ Never
	Do you feel frustated, stressed or uptight? ☐ Daily ☐ 3 times a week ☐ 1 time a week
☐ Two (2) ☐ Two and one-half (2½) ☐ Three (3)	☐ Rarely ☐ Never
☐ More than three	Do you eat greasy or fatty foods?
5. Do you use any one of the following tobacco products? \(\Lambda \)	☐ Daily ☐ 3 times a week ☐ 1 time a week
☐ Pipe Tobacco ☐ Cigars ☐ Snuff ☐ Smokeless Tobacco	☐ Rarely ☐ Never
6. Do you regularly drink alchoholic beverages?	. Do you use street drugs? Yes No
V PAST MEDICAL HIS	
For Annual or Exit Exam - Indicate Char	
 Are you currently being treated for illness or injury? Have you been treated for persistent illness or injury? Ye Ye 	— · · · ·
3. Describe fully any "Yes" responses.	
6. How many days of work did you miss in the last 12 months due to y 7. Have you ever pursued a compensation claim or received disability or disease? 8. Have you ever been turned down for life insurance? CURRENT MEDIC When was the last year you received a tetanus immunization booster?	r payment for occupational injury ave you had injuries from an auto accident? CINES To. day yr. ?//
7. Have you ever pursued a compensation claim or received disability or disease? 8. Have you ever been turned down for life insurance? CURRENT MEDIC When was the last year you received a tetanus immunization booster? Do you currently have presciptions for drugs or medications? Yes No Please specify: used drugs?	r payment for occupational injury ave you had injuries from an auto accident? CINES To. day yr. ? / / er been addicted to or consistently
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7. Have you ever pursued a compensation claim or received disability or disease? 8. Have you ever been turned down for life insurance? CURRENT MEDIC When was the last year you received a tetanus immunization booster? Do you currently have presciptions for drugs Have you ever or medications? Per No Please specify: used drugs? Do you take any of the following medications on a daily basis. Heart Medicine Yes No Aspirin Thyroid medicine Yes No Blood pressor Oral medicine for Diabetes Yes No Medicine for Nerve or sleeping pills Yes No Allergy/Asther Blood thinner Yes No Other: TAMILY HISTO	payment for occupational injury ave you had injuries from an auto accident? CINES To. day yr. er been addicted to or consistently Yes No Please specify: Yes No sure medicine Yes No ater pill) Yes No r seizures Yes No ma medications Yes No
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FOR INITIAL EXAMS ONLY

THIS PAGE IS TO BE COMPLETED ONLY AS INITIAL OR PRE-JOB EXAMS

VIII			PA	ST.	10	B HISTORY			
LIST ALL JOBS	EVER HE	LD STARTI	NG WI	TH YO	UR	R FIRST - INCLUDE PAR	TIME AND VOLUNTEER W	ORK	
NAME OF EMPLOYER	FROM MO/YR	TO MO/YR	# HRS V			DESCRIPTION OF WORK	POTENTIAL HAZARDS (DUST, FUMES HEAT, NOISE, PHYSICAL AGENTS, METALS		
	MOTTA	MO/TH	CHITC	Littoriii					
							·		
					-				
	 	 			\dashv				
					\perp				
		<u> </u>							
IX Same		TO	DXIC	EXF	2 0	SURE HISTORY	, , , , , , , , , , , , , , , , , , ,		
At work or at home have (e.g. gases, fumes, dust) or have y	ou come int	o skin c	zardou contact	us so with	olvents, hazardous airborn h hazardous chemicals?	ne chemicals		
Have you worked with	any of the	materials, o	or unde	r any o	of th	he conditions, listed belo			
		•		-	Ю			YES	ИО
Asbestos						vibrating tools?	red around vibration or with		
Silica (e.g. sandblasting) Coal (e.g. mining)	,			Ĭ		-	the standard was	u	<u>. </u>
Grinding							ted in a doctor's office, here you might have had		
Welding	1.000					exposure to blohaz			
Aerosols						,		-	
Asphalt, pitch or tar							ormed a site assesment on	r-n	_
Beryllium							dustry groups or materials?		
Cadmium						LIST.			
Cotton Dust									
Pesticides Fuel Specify:						Any other hazardou	is exposures		
Fuel Specify: Oils						If "yes," describe th	ese exposures:		
Lead				$\tilde{\Box}$					
Nickel/Chrome									
Paint					\Box			YES	NC
Microwave/Radio Frequ	-					114.0) 04 010 00	I near large industrial plants		
Nuclear Radiation/X-Ray	1					Or arous or an pone	tion?		
Fiberglass Plastics						Hava von avar raca	ived hazardous duty or		
Solvents				n		onvironmental navi	?		
Compressed Gases							n in the military service?		
Aluminum							xposed to biological or		
Iron							ither in training or combat?)		
Tin									
Dusty Environments						,	ked on a HAZMAT team?		
Have you ever worked Where?				Ü,			os or side businesses you ha		
Have you ever worke cold environment?				n		List your current ar	nd previous hobbles:		
Where?									

RESPIRATOR USERS ONLY

THE FOLLOWING 2 PAGES ONLY NEED TO BE COMPLETED BY THOSE ASSIGNED TO USE REPIRATORS.
IF UNCERTAIN ABOUT RESPIRATOR USE, PLEASE COMPLETE

	RESPIRATOR USE			BODY SYSTEMS (CONT.)		
1.	Have you <u>ever</u> worn a respirator in the past?	YES	NO		YES	
2.	What type of respirator did you wear? (mark all that apply) If no go to question 4 Disposable particulate filter mask (non-cartridge dust mask) Half face cartridge respirator Full face cartridge respirator Powered air purifying respirator Supplied air (airline) respirator Self contained breathing apparatus (SCBA) Escape only respirator			Asthma Chronic bronchitis Emphysema Pneumonia Tuberculosis Silicosis Lung cancer Broken ribs Pneumothorax (collapsed lung) Any chest injuries or surgeries 8. Have you ever had seizures (fits)?	0000000000	
3.	If you've ever used a respirator, have you			Have you <u>ever</u> been told you had diabetes		
	ever had any of the following problems? Eye irritation Skin allergies or rashes			(sugar disease)?		
	Anxiety General weakness or fatigue Any other problem or difficulty that			10. Have you <u>eyer</u> had allergic reactions that interfere with your breathing?		
	interfered with your use of a respirator			11. Have you <u>ever</u> experienced claustrophobia (fear of closed-in places)?		
	HEART, LUNGS, AND OTHER			12. Have you <u>ever</u> had trouble smelling odors?		
4	BODY SYSTEMS (CONT.) . Have you <u>ever</u> had an abnormal EKG	YES	NO	13. Have you <u>ever</u> had any of the following pulmonary, cadiovascular, lung or heart symptoms?		
7	(Electrocardiogram)			Shortness of breath		
	Explain:			Shortness of breath when walking fast on level ground or walking up a slight hill or incline		
5	Have you <u>ever</u> had any of the following cardiovascular or heart problems? Heart attack			Shortness of breath when walking with other people at an ordinary pace on level ground		
	Stroke Angina (chest pain) Heart failure			Have to stop for breath when walking at your own pace on level ground		
	High blood pressure Swelling in your legs or feet (not caused			Shortness of breath when washing or dressing yourself		
	by standing or walking) Heart arrhythmia Any other heart problem that you have been told about			Shortness of breath that interferes with your job		
6	. Have you ever had surgery of the arteries, coronary bypass or angioplasty (to correct blocked artery or aneurysm)?(mark only 1 answer) Yes, within the past year Yes, more than 1 year ago No			 14. Do you <u>gurrently</u> take medication for any of the following problems? Breathing Heart trouble Blood pressure Seizure (fits) 15. Have you within the past had any of the 		
6	 Have you ever had any of the following pulmonary or lung problems? Asbestosis 	IJ		the following symptoms of lung illness? Coughing that produces phlegm (thick sputum)	U	LJ

HEART, LUNGS, AND OTHER **FULL FACE OR SCBA** REPIRATOR USER ONLY (CONT.) **BODY SYSTEMS (CONT.)** YES NO YES NO 19. Have you eyer had an injury to your ears, Coughing that occurs mostly when you including a broken ear drum? are lying down 20. Do you currently have any of the following Coughing up blood in the last month hearing problems? \Box Wheezing Diffculty hearing Wheezing that interferes with your job Wear a hearing aid Chest pain when you breath deeply Any other hearing or ear problem Coughing that wakes you early in the Explain: ____ mornina Any other symtoms that you think may be related to lung problems 16. Have you ever had any of the following cardiovascular or heart symtoms? 21. Have you ever had a back injury? Frequent pain or tightness in your chest 22. Do you currently have any of the following Pain or tightness in your chest during muscle or skeletal problems? physical activity Weakness in any of your arms, hands, Pain or tightness in your chest that legs or feet interferes with your job Back pain In the past two years, have you noticed your heart skipping or missing a beat? Difficulty fully moving your arms and legs Heartburn or indigestion that is not Pain or stiffness when you lean forward related to eating or backward at the waist Any other symtoms that you think might Difficulty fully moving your head up and down be related to heart or circulation problems \Box Difficulty fully moving your head side to side **FULL FACE OR SCBA** REPIRATOR USER ONLY Difficulty bending at your knees The following questions must be answered by every employee who has been selected to use either a full-face Difficulty squatting to the ground piece respirator or Air Supply Respirator (Self-Contained Breathing Apparatus (SCBA) or air line). Difficulty climbing a flight of stairs or a YES NO ladder carrying more than 25 lbs. \Box \Box 17. Have you ever lost vision in either eye (temporarily or permanently)? Any other muscle or skeletal problems that might interfere with using a 18. Do you currently have any of the following respirator \square vision problems? Explain:____ Wear contact lenses Wear glasses \Box [] Color blind Any other eye or vision problem

X		FOR YEARLY	EXIT E	XAMIN	10ITA	VS C	NLY	•		
1.	Approximately hast examination	low many days of haz						our		
	b. Approximately h	low many days in Lev	el C (using a	ın air-purify	ring rest	oirator)?-			
	c. Approximately h	now many days in Lev	el B (self-co	ntained bre	athing a	appara	atus or air	line)?		
2	Approximately how last examination?	many different hazar	dous materia	al sites hav	ө уоц w	orked	on since	your 		
3.		mical or other hazards gasoline, arsenic, tric					ntial expos	ure since your	last	
Chem	nicals of Concern	Approximate # of Days	Ex	osure Fre	quency		E	xposure Durat	ion	
		# OLDAYS	Daily	Weekly	Mon	ithly	<1 Hr.	1-8 Hr.	>8 Hrs.	
4. Sli	nce your last exam, h	nave you had difficulty	doing your	i job, becau	se of:		1	'		
b. In c. In d. H	ensitivity to chemicals, ability to perform certa ability to assume certa eat Stress? (circle one than medical reasons?	ain motions? (circle or ain positions? (circle o ain	ne)	Yes Yes Yes Yes Yes	No No No No	Doi Doi Doi	n't Know n't Know n't Know n't Know n't Know			
	ther medical reasons? ave you experienced a			•	-			*		
	nce your last examin work? Yes No	-				l in mo	ore than 3	consecutive da	iys lost t	ime
if [Ha	o you feel that you have "Yes", how would you] Very significant [ave you ever had any "Yes", please describe	quantify your potential Significant [] Insi symptoms or signs (e	al exposure? gnificant	None	D [] Y Un [] Dute to	knowi	n	No []Yes		
	How would you rate t	he effectiveness of the	health and [] Good				for work?			
b. Co	omments:									
			YES NO							NO
	ave you ever had an ill mptom which: Occurred only during			whic	h you th	nink w	ere related	ness or sympto d to you work? a substance	ms	
	Occurred only after wo			whic				st, or sinuses	IJ	
	a weekend or holiday	ı? ¯		12. Have	you ev			substances tha	t	
	Disappeared during v	vacations or weekend	s? ⊔ ∐	irrita	led you	rskin	or caused	a rash?		[]
10.1	Mould you like to talk t	a tha haalibaara arif	venional	wid rough	thia ~:	antina	naira at	duoi assus	YES	NO
	Vould you like to talk t o this questionnaire?	о ине пваяпсате ргож	555 OHAI W'10	wint reverw	uns da	ฮอมปก	naire aboi	л you answers		:

STOPI: PHYSICIANS COMPLETE THE REMAINING SECTIONS.

PHYSICAL EXAMINATION AND SUPPORTING STUDIES (Please initial on Authorization Form when completed) HEIGHT WEIGHT TEMP. **BLOOD PRESSURE** _°F ___lbs. inches PULSE (Resting) For D.O.T. only: Pulse immediately after 2/min. exercise: /min. Visual acuity (if applicant wears glasses, test and record VISION **COLOR VISION** both with and without glasses.) Normal Both **NEAR** Left Right Abnormal 20/ 20/ Corrected 20/ Can recognize Red & Green 20/____ 20/ 20/____ Uncorrected **PERIPHERAL VISION** FAR Left Right Both 20/_____ 20/_____ Normal Corrected 20/ 20/ 20/____ Uncorrected Abnormal **URINALYSIS** Albumin____ Specified Gravity __ _ Female: LMP ___ Blood ____ Sugar AUDIOGRAM (If marked YES on Exam Checklist): 500 1000 2000 3000 4000 6000 8000 Right Left Note: Testing documentation must be forwarded to WorkCare SPIROMETRY (If marked YES on Exam Checklist): FEV, ____ Observed Vol. FVC Observed Vol. Predicted %_____ FVC FEV, Predicted % **FVC** Note: Testing documentation must be forwarded to WorkCare EKG (If marked YES on Exam Checklist); ☐ Normal ☐ Abnormal Note: All EKG strips must be forwarded to WorkCare CHEST X-RAY (If marked YES on Exam Checklist): ☐ Abnormal ☐ Normal Comments: ___

SPECIMEN COLLECTION PER EXAM CHECKLIST

All laboratory specimens must be shipped by the day of the exam! If this is a Friday exam, mark Airbill for Saturday delivery. Exam data should be included for shipment in the box with the laboratory specimens.

	MEDICAL	EXAMINA	TION
CHECK LIST	NORMAL	ABNQRMAL	DETAILED DESCRIPTION OF ABNORMAL FINDINGS
HANDS/SKIN		7.10/15/14/14	250 250 0500 HOLD VOID VINAVELIADIAO
HAIR			
SKIN COLOR/TEXTURE NAILS			
HEAD/EYES/EARS/NOSE/THROAT/MOUTH			
CONFIGURATION LIDS/CONJ/SCLERA			
PUPILS/FUNDI/EOM			
PINNA/CANALS/TM NASAL SEPTUM/MUCOSA			
TEETH/GUMS/TONGUE/PALATE			
NERVOUS SYSTEM CENTRAL			
MOTOR			
SENSORY CEREBELLAR			
REFLEXES			
NECK/NODES BRUIT			
ROM			
MUSCLE STRENGTH THYROID		<u></u>	
CERVICAL NODES			
INGUINAL/AXILLARY NODES		<u> </u>	
CHEST/LUNGS SHAPES/SYMMETRY			
DIAPHRAGMATIC EXCURSION			
PERCUSSION AUSCULTATION			
CARDIOVASCULAR CAROTIDS			
NECK VEINS/PULSES			
HEART SOUNDS (MURMURS) HEART SIZE			
GASTRO/INTESTINAL LIVER		. CI	
SPLEEN			
MASSES TENDERNESS			
SCARS	П		
HERNIA		(¯]	<u> </u>
MUSCULOSKELETAL/EXTREMITIES SPINAL ALIGNMENT			
EXTREMITIES			
(EDEMA, VARICOSITIES) - JOINTS			
пом			<u> </u>
COMMENTS:			
EXAMINING PHYSICIAN (PR NT)	PHYSICIAN SIGN.	ATURE	DATE
1			<u></u>
			1

SUMMARY OF FINDINGS AND COMMENTS RELEVANT TO ABNORMAL CONDITIONS
Signature of Licensed Examining Physician:
Printed Name:
Phone: ()

INSTRUCTION FOR PHYSICIAN/CLINICIAN

- 1. The results of the required testing should be recorded on page 10.
- 2. Please be sure to note EKG and chest x-ray readings on NORMAL or ABNORMAL on page 10 if <u>required for this</u> exam.
- 3. Please review any YES answers ONLY for questions on pages 4, 5, 7, 8 and 9 of this booklet.

You are not required to review the other history questions.

- 4. Your physical examination findings should be recorded on page 11.
- 5. The booklet and any specimens must be shipped to our laboratory THE DAY OF THE EXAM.

QUESTIONS? CALL WORKCARE 1-800-455-6155



Transforming Occupational Health

1-(800) 455-6155



Date

Please answer each question.

Health and Safety Program

Attachment 24-2

MEDICAL SURVEILLANCE EVALUATION

This information will be used to determine routine medical screening exams for employees who work outside of an office setting. In addition, Site Health and Safety Plans may specify project related medical surveillance for regulated substances.

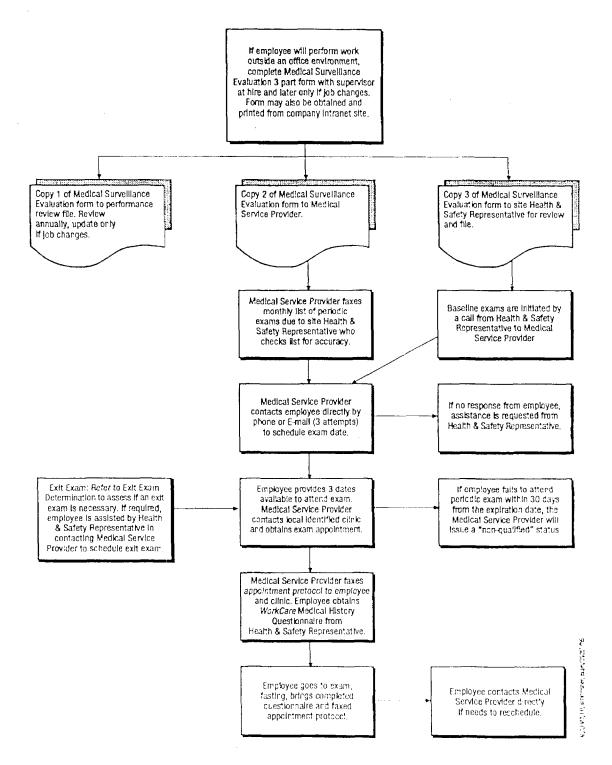
Phone			SSN	Employee #
Job Title				
Location			Supervisor	-
Health & Saf	ety Rep	resent	ative	
Division			Region/ Bu	usiness Unit
Choose One	: O	New E	mployee O Cur	rent employee w/ job change
				ated medical screenings and
surveillance	e requir	ement	ts:	
surveillance	Yes	e <i>ment</i> No	ts:	
			Does your job require you respirator use?	u to wear a respirator or be certified for er year? 01-29 030+
Respirator	Yes	No	Does your job require your respirator use? If yes, how many days per Does you job ever require	_
Respirator Hearing Asbestos	Yes	No O	Does your job require your respirator use? If yes, how many days per Does you job ever require work around heavy equiper or > 85dBA TWA) Do you perform intrusive demolition, etc.)	er year?
Respirator Hearing	Yes O	No O O	Does your job require your respirator use? If yes, how many days per Does you job ever require work around heavy equiper or > 85dBA TWA) Do you perform intrusive demolition, etc.) Are you currently perform be exposed to lead above currently in a job that requiremently in a job that	er year? O 1-29 O 30+ e your to wear hearing protection or oment on a construction project? (Noise
Respirator Hearing Asbestos	Yes O O	No O O	Does your job require your respirator use? If yes, how many days per Does you job ever require work around heavy equiper or > 85dBA TWA) Do you perform intrusive demolition, etc.) Are you currently perform be exposed to lead above currently in a job that requires in a series of the performance of	er year? O 1-29 O 30+ e your to wear hearing protection or ement on a construction project? (Noise work with asbestos? (i.e., sampling, ning construction work where you may e the OSHA action level or are you juired you to be in a medical surveillance emoval of lead based paint or other

URS SAFETY MANAGEMENT STANDARD Medical Screening & Surveillance Exam Protocol

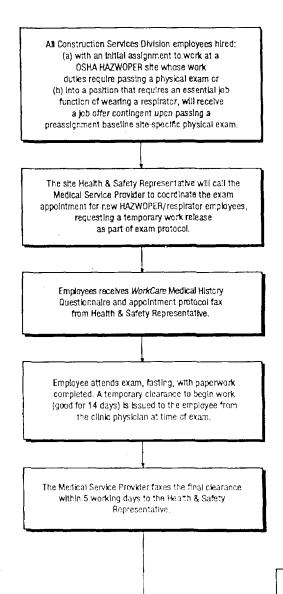
PROTOCOL	HAZWOPER Baseline or Preassignment	HAZWOPER Annual or	HAZWOPER Exit	DOT Driver Certification (Baseline and	ASBESTOS (Basellne, Annual and Exit)	MINI- RESPIRATOR (Baseline and
16 11 1 171 1	Baseline	Biennial		Biennial)	 	Blennial)
Medical History	X		x	x -	x	X
& Respiratory	X	X	^	A '	^	Α.
Questionnaire		 				
OSHA Asbestos		1				
Questionnalre		1			X	
(Initial or						
Periodic)		 				
Medical Exam	X	X	X	X	X	If indicated by questionnaire
Physical Exam		1	j			
(height, weight,						
pulse, oral	X	X	X	X	X	
temperature,						
blood pressure)	·					
Non-resting pulse				X		
Vision	X	X	X	X	X	
Urinalysis	X	X	X	X		
Audiogram					(if indicated by	1 4 1 1 1 1 1 1 1 1 1 1
(hearing test)	Х	X	X	X	project noise levels)	
Spirometry						
(pulmonary	X	X	X		X	X
function test)						
Electro- cardiogram (EKG)		•	. :. :			
EKG Age < ≈ 40		Every 3 years for				· · · · · · · · · · · · · · · · · · ·
2112115	x	annual, every 4		Ì	· ·	
		years for blennial				
EKG Age 41-55	X	Every 2 years	······································		T	
EKG Age 56+	L	Every year for				
nite ingo so	X	annual, every 2				
		years for blennial		•		
Chest x-ray		+ * 			- 	
(one view)	}				}	
Age \leq or $= 40$		Every 3 years for	If symptomatic		Baseline and	
	X	annual, every 4	or due on	ĺ	every 5 years per	
		years for blennial	periodic	Ì	OSHA 1910.1001	
Age 41-55	X	Every 2 years	If symptomatic		Baseline and	
Б.	,-	10.11, 2,011	or due on)	every 2-5 years	
	İ		periodic	ļ	per OSHA	Į
			•		1910.1001	1
Age 56 ·	X	Every year for	If symptomatic		Baseline and	t
J		annual, every 2	or due on		every 1-5 years	}
		years for bleunlal	periodic		per OSHA	
	1			I	1910.1001	ļ
B-reader				I	X	
Complete Blood					1	
Count with	X	X	X	1	1	Ì
White Cell				}	1	
Differential					1	}
Blood Chemistry	X	X	X	I	1	
Panel				1	1	1

^{*}Note: Additional entry, periodic, and exit biological monitoring or toxicological screening may be indicated in the project-specific health & safety plan. Examples include: blood lead/ZPP, serum/RBC cholinesterase, urlne heavy metals (arsenic, cadminm, mercury, chromium, or beryllium), urine radiation (thorium, uranium), biological vaccinations (hepatitis B, hepatitis A), blood benzene, blood beryllium LPT, etc.

Medical Surveillance Exam Process

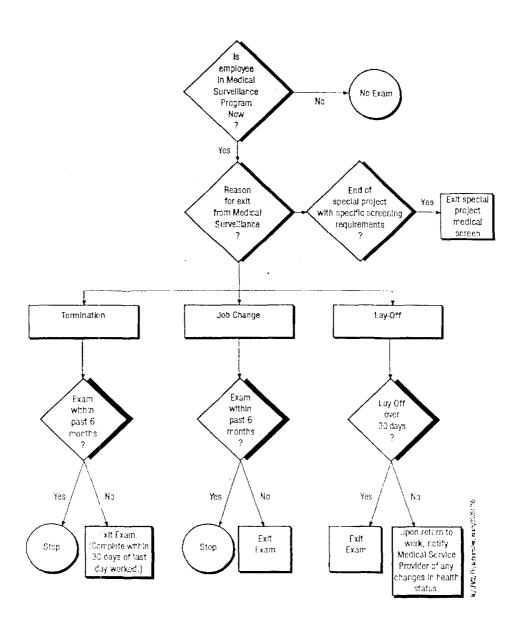


Construction Services Division HAZWOPER & Respirator Preassignment Baseline Exam Process



If there are work restrictions, an evaluation will be made to see if an alternative job is available. If none, the offer will be remainated and the Individual will be released.

Exit Exam Determination



Note:

Exit exams from Medical Service Provider or previous employer may be used for review as a URS Corporation baseline exam if completed within the past 3 months. A *WorkCare* Medical History Questionnaire is completed by the employee and submitted with a copy of the previous exam for physician review and approval.



Health and Safety Program

Attachment 24-7

WAIVER OF EXIT MEDICAL SURVEILLANCE EXAM

I have been a participant in URS' Medical Screening & Surveillance Program which entitles me to an exit medical screening exam upon reassignment to a position that does not require medical clearance or termination of my employment. I understand that URS encourages employees to schedule and complete an exit medical exam, however, I voluntarily relinquish the opportunity to have an exit medical exam.

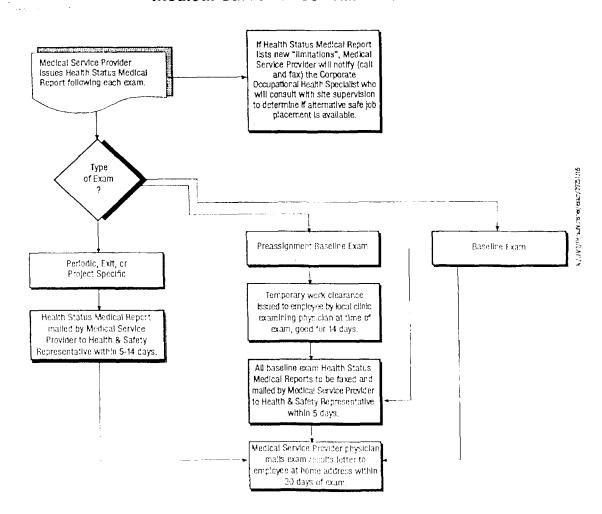
Name				
Employee	Number			
Date				
Employee	Sianatura			

Exam Follow Up Procedures

Billing



Medical Surveillance Exam Clearances



URS SAFETY MANAGEMENT STANDARD Field First Aid Kit Supply List

- Portable, plastic or metal, water resistance first aid kit, with handle
- Bloodborne pathogens personal protective equipment kit (minimum requirements are latex gloves and CPR shield)
- · First aid manual
- Ace bandage 3"
- · Assorted band aids
- Sterile gauze pads 4" x 4"
- Sterile non-stick gauze pads 2" x 3"
- Paper tape (hypo-allergenic)
- Burn ointment (for minor burns, use after cold water soak)
- Antibiotic ointment (Neosporin or generic)
- Alcohol prep pads
- lodine prep pads (if not allergic to iodine, use after soap and water wash for bloodborne exposure)
- Ice pack
- Gauze roll 2"
- Butterfly strips (wound closure)
- Tweezers (one use, disposable)
- Temperature strips
- Flashlight
- Triangular bandage
- · Bandage scissors
- Sterile normal saline eye wash, 4 ounce bottle
- · Ammonia inhalant ampoules
- · Insect sting relief wipes or spray

Certificate	of Approval:	
	Peter P. Greaney, MD	Date
	WorkCare Medical Director	

D&MG SAFETY MANAGEMENT STANDARD NEW EMPLOYEE HEALTH AND SAFETY ORIENTATION

1.0 Applicability

This procedure is applicable to newly-hired D&MG personnel.

2.0 Purpose and Scope

The New Employee Health and Safety Orientation is designed to introduce new employees to the Dames & Moore Health and Safety Management System. The orientation is intended to be a brief overview, and does not take the place of task or program specific health and safety training. In the course of the orientation, the manager will determine which additional training courses the new employee needs to complete prior to being assigned to specific job tasks.

3.0 Implementation

Office Locations - Implementation of this program is the responsibility of the

Location Manager.

Field Activities - Implementation of this program is the responsibility of the

Project Manager.

It is anticipated that this SMS will primarily be implemented in the office. However, for those new employees who have already completed appropriate training for field tasks, the orientation may be conducted by the Project Manager.

4.0 Requirements

A. Time for completion

Complete the New Employee Health and Safety Orientation within one week of the employee's start date.

- B. Address the following General Orientation Topics (use At:achment 25-1):
 - 1. Office/Project Emergency Action Plan.
 - a) Evacuation routes and assembly areas.
 - b) Fire extinguishers/alarms.
 - c) Office layout.

- 2. Reporting unsafe or unhealthful working conditions.
 - a) General reporting to supervisor.
 - b) Anonymous reporting to Health and Safety Representatives.
- 3. Accident reporting.
- 4. General office safety.
- 5. D&MG Health and Safety Management System overview.
 - a) Health and safety organization and representatives.
 - b) Philosophy and responsibilities.
- 6. Health and safety training program.
 - a) Describe program.
 - b) Review training background.
 - c) Complete Health and Safety Classification, send to Division Health and Safety Manager.
 - d) Obtain training certificates, send to Division Health and Safety Manager.
 - e) Assign training courses per assignment.
- 7. Health and safety committees (where applicable).
 - a) Describe committee organization.
 - b) Introduce to committee chair.
- C. Address the following Field Orientation Topics (use Attachment 25-2):
 - 1. Obtaining Safe Work Plans.
 - a) Describe Hazard Analysis Process.
 - b) Review forms and Project Hazard Analysis Process.
 - 2. Obtaining personal protective clothing and equipment.
 - a) Review SMS for PPE.
 - b) Describe process for obtaining PPE.
 - 3. Division's Medical Surveillance Program.
 - a) Describe program requirements.
 - b) Determine if program participation is required.

5.0 Documentation Summary

File these records in the Safety Filing System:

- A. Completed New Employee Orientation Checklist(s).
- B. Training assignment matrix.
- C. Health and Safety Classification Form.

6.0 Resources

- A. Health and Safety Management System
- B. Office Emergency Action Plan



D&MG Health & Safety Program NEW EMPLOYEE GENERAL SAFETY ORIENTATION CHECKLIST

-	yee: Employee No: Conducted by:						
	Employee initials to indicate that topics have been discussed.	Initials					
1.	Office Emergency Action Plan						
	Evacuation routes and assembly areas						
	Locations of fire extinguishers and alarms						
	General office layout						
2.	Reporting unsafe or unhealthful working conditions						
	General reporting of unsafe conditions to Supervisor						
	 Anonymous reporting to Health and Safety Representative 						
3.	Accident reporting system						
4.	General office safety						
5.	DMG Health and Safety Management System overview	ļ					
	Health and safety organization and representatives	<u> </u>					
	Philosophy and responsibilities						
6.	Health and safety training program						
	Program description						
	Training background review						
	 Complete Health and Safety Classification Form, send to Division Health and Safety Manager 						
	Provide copies of training certificates						
	Assign training courses appropriate for assignment						



D&MG Health & Safety Program NEW EMPLOYEE FIELD SAFETY ORIENTATION CHECKLIST

Emplo	yee: Employee No:	
Date:	Conducted by:	
	Employee initials to indicate that topics have been discussed.	Initials
	General and the second	
1.	Obtaining Safe Work Plans (Health and Safety Plans)	
	Describe Hazard Analysis Process	
	Review request forms and requirements	
2.	Obtaining personnel protective clothing and equipment	
	Review Safety Management Standard for PPE	
	Describe process for obtaining PPE	
3.	Division Medical Surveillance Program	
	Describe Program elements	
	 Determine if program participation may be required; submit classification form to Division Health and Safety Manager 	
		<u> </u>
⊏mbl0	vee signature: Date:	

1. Applicability

This procedure applies to URS Corporation facilities and field operations where URS Corporation personnel may encounter noise exposures that may exceed 85 dBA as an 8 hour Time Weighted Average.

2. Purpose and Scope

The purpose of this procedure is to protect employees from hazardous noise exposures and to prevent hearing loss.

3. Implementation

Office/Lab locations: High noise is unlikely to be encountered at URS offices,

however, if applicable, the implementation of this program

is the responsibility of the Office Manager.

Field Activities: Implementation of this program is the responsibility of the

Project Manager.

4. Requirements

A. General

The use of hearing protectors in any location where powered or motorized equipment or any other noise source could reasonably be expected to exceed 85 dBA. Use of hearing protectors may only be discontinued when noise levels are verified to be less than 85 dBA through a properly conducted noise survey. Whenever information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the project manager or location manager will be responsible to enforce the proper use of hearing protectors.

B. Hearing Protectors

1. Require that at least two (2) types of hearing protectors are available to employees free of charge, preferably a plug and a muff type.

2. Minimum Noise Reduction Ratings (NRR)

Hearing protectors issued must have the following minimum NRR:

Ear Plug Muffs 29 dBA 27 dBA

3. Require that hearing protectors are used and thus effectively protect hearing.

C. Noise Surveys

- Noise surveys must be conducted in a manner that reasonably reflects the exposure of the affected employees. Surveys must be conducted under the supervision of a URS Safety Program Representative.
- Sound level meters and audio dosimeters used to determine employee exposure to noise sources must be Type II (accurate to within +/- 2 dBA), operated in "slow" response, on the "A" scale, and be calibrated to factory guidelines (including periodic factory recalibration).

D. Noise Controls

Eliminate noise sources to the extent possible. Examples of controls that must be considered follow:

- 1. Addition or replacement of mufflers on motorized equipment.
- 2. Addition of mufflers to air exhausts on pneumatic equipment.
- 3. Following equipment maintenance procedures to lubricate dry bearings.
- 4. Isolation of loud equipment with newer and guieter models.

E. Audiometric Exams

1. Tests

Details on the medical surveillance program (including audiometric testing) are included in <u>SMS 24</u>.

Audiometric tests shall be performed by a person meeting OSHA's 1910.95 (g)(3)'s definition. Within 6 months of an employee's first exposure at or above the action level, a valid baseline audiogram shall be established against which subsequent audiograms can be compared. Testing to establish a baseline audiogram shall be preceded by 14 hours without exposure to noise. Hearing protectors may be used as a substitute for the requirement that

baseline audiogram shall be preceded by 14 hours without exposure to workplace noise. The medical surveillance provider shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination. For multi-year projects, an annual audiogram shall be obtained for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if there is a standard threshold shift (STS). If the annual audiogram shows that an employee has suffered a standard threshold shift, the employer will obtain a retest within 30 days and consider the results in assessing an STS as the annual audiogram. The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. If an STS has occurred, the medical surveillance provider will notify the employee within 21 days of the determination.

2. Standard Threshold Shifts

If an employee's test results show a confirmed STS, their hearing protection will be evaluated and refitted, and a medical evaluation may be required.

F. Training

Verify that each employee who must work in a noisy environment is current on the required Hearing Conservation Training. Training must include the following topics:

- The effects of noise on hearing.
- 2. The purpose of hearing protectors.
- 3. The advantages and disadvantages of various types of hearing protectors.
- 4. The attenuation of various types of hearing protection.
- 5. The selection, fitting, care, and use of hearing protectors.
- 6. The purpose of audiometric testing.

7. An explanation of the audiometric testing procedure.

5. Documentation Summary

- A. File these records in the Office Safety Filing System:
 - 1. Noise surveys, when applicable.
 - 2. Training Records.
- B. File noise surveys, when applicable, in the Project Safety File:

6. Resources

- A. U.S. OSHA Standard Occupational noise exposure 29 CFR 1910.95
- B. <u>U.S. OSHA Construction Standard Occupational noise exposure 29</u> CFR 1926.52
- C. U.S. OSHA Technical Links Noise and Hearing Conservation
- D. American Industrial Hygiene Association: The Occupational Environment Its Evaluation and Control, Chapter 20. Fairfax, VA: 1997
- E. National Hearing Conservation Association web site
- F. URS SMS 24 Medical Screening and Surveillance

URS SAFETY MANAGEMENT STANDARD Work Over Water

1. Applicability

This procedure applies to URS projects where personnel will work above or immediately adjacent to water where a drowning hazard exists. Refer to <u>SMS</u> 053, "Marine Safety and Boat Operations."

2. Purpose and Scope

This procedure is intended to protect employees from drowning while working above or adjacent to water.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

- A. Review the project in the planning phase to determine if any work will occur above or immediately adjacent to water where a drowning hazard exists. In general, a risk of drowning (ROD) is present when:
 - 1. Employees perform work on or under bridges without constant protection from falling into the water, or
 - 2. Working surfaces at riverbanks slope so steeply that an employee could slip or fall into the water when no portable protection (like roping off) is used.

NOTE: Employees working on or under bridges who are constantly protected by guardrail systems, nets, or body belt/harness systems are deemed to be adequately protected from the danger of drowning and are not required to wear life jackets or buoyant work vests.

- B. If any activities pose a risk of drowning do the following during the activity:
 - 1. Provide employees with an approved (USCG for U.S. operations) life jacket or buoyant work vest. Employees should inspect life jackets or work vests daily before use for defects. Do not use defective jackets or vests.
 - 2. Post ring buoys with at least 90 feet (27 meters) of line next to the work area. If the work area is large, post extra buoys 200 feet (60 meters) or less from each other.

URS SAFETY MANAGEMENT STANDARD Work Over Water

- 3. Provide at least one life saving skiff, immediately available at locations where employees are working over or adjacent to water. Require that the skiff is in the water and capable of being launched by one person and is equipped with both motor and oars.
- 4. Designate at least one employee on site to respond to water emergencies and operate the skiff at times when there are employees above water.
 - a. If the designated skiff operator is not within visual range of the water, provide him or her with a radio or provide some form of communication to inform them of an emergency.
 - b. Designated employee should be able to reach a victim in the water within three to four minutes.
- 5. Require that at least one employee trained in CPR and first aid is on site during work activities.

5. Documentation Summary

Records required in the Project Safety File:

Copy of the fall protection plan designed for work activities – (as necessary)

6. Resources

- A. U.S. OSHA Standard Working Over or Near Water 29 CFR 1926.106
- B. U.K. (Health, Safety & Welfare) Regulations

D&MG SAFETY MANAGEMENT STANDARD

PORTABLE LADDERS

1.0 Applicability

This procedure applies to D&MG office and field locations where portable ladders are used.

2.0 Purpose and Scope

The purpose of this procedure is to require the safe use and proper construction, inspection, and maintenance of ladders at D&MG fixed site and project locations.

3.0 Implementation

Field Activities - Implementation of this procedure is the responsibility of the

Project Manager.

Office Locations - Implementation of this procedure is the responsibility of the

Location Manager.

4.0 Requirements

A. General

- 1. Provide ladders for safe access to all elevations where permanent or temporary stairways or suitable ramps or runways are not provided.
- 2. Never use ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction. When ladders with such defects are discovered, they shall immediately be withdrawn from service.
- 3. Place ladder feet on a substantial base and keep the area around the top and bottom of the ladder clear.
- 4. Do not place ladders in passageways, doorways, driveways, or any location where they may be displaced by activities being conducted in any other work, unless protected by barricades or guards.
- 5. Tie, block, or otherwise secure ladders while in use to prevent their being displaced.

- 6. Never use metal ladders for electrical work or where they or the user may contact electrical conductors.
- 7. Require that ladders are equipped with non-skid safety feet.
- 8. Use only Type I Industrial wooden, fiberglass, or metal ladders.

B. Straight and Extension Ladders

- 1. Position straight and extension ladders at such a pitch that the horizontal distance from the top support to the foot of the ladder is about one-quarter of the working length of the ladder (one foot (30 cm) out for every four feet 1.2 metres) up).
- 2. Do not use ladders in a horizontal position as platforms, runways, or scaffolds.
- 3. Extend the side rails at least 36 inches (91 cm) above the landing. When this is not practical, install grab rails which provide a secure grip.
- 4. When using two section extension ladders, the two sections must have a minimum overlap of 3 feet (91 cm) for working lengths up to 33 feet (10 metres), and 4 feet (1.2 metres) for working lengths up to 44 feet (13 metres). Extension ladders must not exceed 44 feet in length when extended in accordance with this lap schedule.
- 5. Do not permit anyone to stand on the top three rungs of a straight or extension ladder.

C. Stepladders

- 1. Always fully open and lock side braces when using stepladders.
- 2. Use straight or extension ladders for access. Stepladders are meant to be used as temporary elevated working platforms only.
- 3. Do not place planks on the top steps of stepladders.
- 4. Never stand on the top two steps of a stepladder.
- 5. Require that all four feet of the ladder have an even, solid footing.

D. Training

Train each employee in the safe, proper use of ladders, including the following:

- 1. Do not carry materials up or down use a hand line.
- 2. Face the ladder when ascending or descending.
- 3. Position the ladder at the proper pitch.
- 4. Secure the top and bottom of the ladder to prevent displacement.
- 5. Require proper extension (3 feet/91 cm) above landing.
- 6. Never overreach work only within an arm's length of the ladder.
- 7. Allow only one person on a ladder at a time.

E. Inspections

- Conduct thorough periodic inspections of all ladders to identify cracks, broken rungs, and deterioration. Ladders found to be in an unsafe condition must be removed from the workplace immediately. When immediate removal is not possible, the ladder shall be conspicuously tagged "DANGER - DO NOT USE" until such time as removal is possible.
- 2. Inspect each ladder for unsafe conditions before each use.

5.0 Documentation Summary

Place in the Project Safety File:

- A. Site safety briefings regarding ladder use and inspection.
- B. Records of ladders taken out of service and/or removed from site.

6.0 Resources

- U.S. OSHA Construction Standard Stairways and Ladders 29 CFR 1926
 Subpart X
 - (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_X.html)
- B. U.S. OSHA Standard Portable Ladders 29 CFR 1910. 25 26 (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1910_SUBPART_D.html)

- C. ANSI A.14.1 1982, Ladders (http://www.ansi.org/cat_top.html)
- D. ANSI A.14.2 1982, Ladders (http://www.ansi.org/cat_top.html)
- E. Australian Standards AS1892.1-1996, AS1892.2-1992, AS1892.3-1996 Portable Ladders

1. Applicability

This program applies to URS Corporation laboratory and field operations where the use of Personal Protective equipment (PPE) is warranted. Refer to <u>SMS 42</u>, "Respiratory Protection", for respiratory hazards. Hearing Protection issues are additionally addressed in <u>SMS 26</u>, "Noise and Hearing Conservation."

2. Purpose and Scope

This procedure provides information on recognizing those conditions that require personal protective equipment as will as selecting personal protective equipment for hazardous activities.

3. Implementation

Shop/Lab Locations - Implementation of this program is the responsibility of the Office Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

- A. Perform hazard assessments for those work activities that are likely to require the use of PPE.
 - 1. Use Attachment 29-1 to perform the assessment.
 - 2. Reevaluate completed hazard assessments when the job changes.
- B. Eliminate the hazards identified in <u>Attachment 29-1</u>, if possible, through engineering or administrative controls.
- C. Select PPE that will protect employees if hazards cannot be eliminated.
 - 1. See Attachment 29-1 for recommended PPE.
 - 2. Review Material Safety Data Sheets for chemicals used for PPE recommendations.
 - 3. If needed, consult with the URS Health and Safety Representative for assistance in selecting PPE.

- D. Provide required PPE to employees free of charge (excluding in some instances components of standard work attire such as steel-toed boots), assuring that it fits properly giving them a choice if more than one type is available.
- E. Whenever a hazard is recognized, and PPE is required, the employees will be provided with the appropriate PPE. However, when a PPE is not required, and the employee selects to wear his or her own PPE, the project manager shall ensure that the employee is properly trained in the fitting, donning, doffing, cleaning, and maintenance of his or her employee owned equipment.
- F. Conduct and document employee training.
 - 1. Train all employees who are required to wear PPE.
 - 2. Require that training includes:
 - a. When PPE is necessary to be worn.
 - b. What PPE is necessary.
 - c. How to properly don, doff, adjust and wear PPE.
 - d. Limitations of PPE
 - e. Proper care, maintenance, useful life and disposal of PPE.
 - 3. Training must be conducted before PPE is assigned.
 - 4. Refresher training is needed when:
 - a. New types of PPE are assigned to the worker.
 - b. Worker cannot demonstrate competency in PPE use.
 - 5. Keep written records of the employees trained and type of training provided, including the date of training.
- G. Maintain Protective Equipment
 - Check personal protective equipment for damage, cracks, and wear prior to each use. Replace or repair equipment not found in good condition.

- 2. Wash off contaminated protective equipment with water and mild soap, if necessary, to prevent degradation of the equipment.
- H. Periodically inspect worksites where employees are using personal protective equipment, using Attachment 29-2.
 - 1. Field activities inspect work sites at least monthly.
 - 2. Office locations inspect work sites semi-annually.

5.0 Documentation Summary

- A. Records required in the Project Safety File:
 - 1. Completed Hazard Assessment Certification Forms (<u>Attachment 29-1</u>)
 - 2. Completed Personal Protective Equipment Inspection Sheet (Attachment 29-2)
 - 3. Documentation of employee training.
- B. Records required in the Laboratory Safety Filing System:
 - 1. Completed Hazard Assessment Certification Forms (<u>Attachment 29-1</u>)
 - 2. Completed Personal Protective Equipment Inspection Sheet (Attachment 29-2)
 - 3. Documentation of employee training.

6.0 Resources

- A. U.S. OSHA Standards Personal Protective Equipment -29CFR 1910
 Subpart I
 (http://www.osha-slc.gov/SLTC/lead/index.html)
- B. U.S. OSHA Construction Standard Personal Protective Equipment –29
 CFR 1926 Subpart E
 (http://www.osha-slc.gov/OshStd toc/OSHA Std toc 1926 SUBPART E.html)
- C. U.S. OSHA Technical Links Personal Protective Equipment (http://www.osha-slc.gov/Sl_TC/personalprotective_equipment/index.html)

- D. Australian Standards SAA HB9-1994 Occupational Personal Protection
- E. American National Standards Institute, ANSI Z89.1-1986, Protective Headwear (http://www.ansi.org/cat_top.html)
- F. American National Standards Institute, ANSI Z87.1 1989, Eye and Face Protection (http://www.ansi.org/cat_top.html)
- G. American National Standards Institute, ANSI Z41.1 1991, Foot Protection (http://www.ansi.org/cat_top.html)
- H. SMS 40 Fall Protection
- I. Attachment 29-1 Hazard Assessment Form
- J. Attachment 29-2 PPE Inspection Form

URS Corporation

URS Corporation Health & Safety Program HAZARD ASSESSMENT CERTIFICATION FORM

Location	cation: Job No:							
Date :	ate : Assessment Conducted by:							
Specifi	Specific tasks performed at this location:							
	Are any of the following present during the task?	No	Yes (Hazard Present)	Eliminate Hazard or Use Following PPE				
	Overhead I	Hazard	s					
1.	Suspended loads that could fall			Hard hat, ANSI Class A, B				
2.	Overhead beams or load that could strike head			Hard hat, ANSI Class A, B				
3.	Energized wires or equipment that could strike head			Hard hat, ANSI Class B				
4.	Employees working above at an elevated site who could drop objects on others below			Hard hat, ANSI Class A, B				
5.	Sharp objects or corners at head level			Hard hat, ANSI Class A, B or C				
	Eye Haz	ards	<u> </u>					
6.	Chemical splashes or irritating mists			Chemical protective goggles See Attachment 29-3				
7.	Excessive dust			Safety glasses or impact goggles				
8.	Smoke & fumes			Chemical protective goggles				
9.	Welding operations		,	See Attachment 29-3 and 29 T-1				
10.	Lasers/optical radiation			See Attachment 29-3 and Reference F				
11.	Projectiles			See Attachment 29-3				
12.	Sawing, cutting, chipping, grinding	<u> </u>		See Attachment 29-3				
	Face Ha	zards						
13.	Chemical splashes or irritating mists			Face shield if chemical is irritating to the skin or is corrosive. See Attachment 29-3				
14.	Welding operations			See Attachment 29-3 and 29-T1				
15.	Projectiles			See Attachment 29-3 and face shield				
	Hand Ha	zards	·					
16.	Chemical exposure			Use resistant gloves as recommended by manufacturer - See Best Chemrest Guide				
17.	Sharp edges, splinters, etc.	}		Leather gloves				

Location:	lab No.
LOCATION.	Job No:

	Are any of the following present during the task?	No	Yes (Hazard Present)	Eliminate Hazard or Use Following PPE
18.	Temperature extremes - heat			Leather gloves; hot mill gloves; Kevlar gloves, welders' gloves
19.	Temperature extremes - cold			Leather gloves; insulated gloves
20.	Blood, fungus		1.	Nitrile gloves
21.	Exposure to live electrical current			Electrical gloves - See Reference H
22.	Sharp tools, machine parts, etc.			Leather gloves, kevlar gloves
23.	Material handling			Leather gloves
	Foot Ha	zards		
24.	Heavy materials (greater than 50 pounds) handled by employees		1.5	Safety shoes or boots
25.	Potential to crush whole foot			Safety shoes or boots with metatarsal guard
26.	Sharp edges or points - puncture risk			Safety shoes or boots
27.	Exposure to electrical wires			Safety shoes or boots with electrical protection
28.	Unusually slippery conditions			Rubber soled boots or grips
29.	Chemical contamination			Rubber, nitrile boots or boot covers
30.	Wet conditions			Rubber boots or boot covers
31.	Construction/demolition			Safety shoes or boots with metatarsal guard if who foot crushing hazard exists.
	Fall Haz	ards		
32.	Elevations above 6 feet without guardrails			Full body harness, ANSI A-10.14 - 1991 - See Reference G
33.	Suspended scaffolds, boatswain's chairs, float scaffolds, suspended staging.			ANSI Type II - full body harness - See Reference G
34.	Working in trees			ANSI Type I full body harness - See Reference G
35.	Working in vehicle mounted, elevating work platforms (bucket trucks, pin-on platforms, etc.)			ANSI Type II full body harness - see Reference G
	Water Ha	azards		
36.	Working on or above water where drowning hazards exist			U.S. Coast Guard approved personal flotation device, Type I, II, or III PFD
	Excessive He	at or FI	ame	
37.	Full body chemical protective clothing in temperatures greater than 80 degrees			Cooling vest
38.	Work around molten metal or flame			Nomex or kevlar clothing

any of the following present during the task? ding activities	No	Yes (Hazard Present)	Eliminate Hazard or Use Following PPE
ding activities		1	
			Welding leathers for those areas that are exposed to flame, spars or molten metal
Respiratory	Hazard	s	
SMS for RESPIRATORY PROTECTION for ection guidance			
Excessive	Noise		
osure to noise			Ear plugs or muffs
Body and Leg	Protec	tion	
emical exposure			Have local DMG H&S representative assist you in proper selection
ng chainsaw, cutting brush	1	1	Chainsaw chaps
	SMS for RESPIRATORY PROTECTION for ction guidance Excessive osure to noise Body and Leg	SMS for RESPIRATORY PROTECTION for ction guidance Excessive Noise osure to noise Body and Leg Protection and exposure	ction guidance Excessive Noise osure to noise Body and Leg Protection emical exposure

URS Corporation

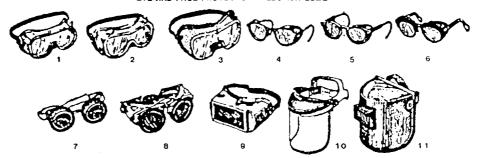
URS Corporation Health & Safety Program PERSONAL PROTECTIVE EQUIPMENT INSPECTION SHEET

Date I	Inspected: Name of Inspector:	Name of Inspector:				
		True	False (= Hazard - Needs to be fixed)			
	Hard Hats					
1.	The brim or shell does not show signs of exposure and excessive wear, loss of surface gloss, chalking or flaking.					
2.	Suspension system in hard hat does not show signs of deterioration including cracking, tearing or fraying.					
3.	The brim or shell is not cracked, perforated or deformed.					
4.	Employees us hard hats in marked areas.					
5.	Hard hat areas are marked.					
11	Safety Shoes	17, 11				
6.	Safety shoes used by employees do not show signs of excessive wear.					
7.	Safety shoe required areas are marked.					
	Work Gloves	e de la grande de la grande de la grande de la grande de la grande de la grande de la grande de la grande de l La grande de la grande d				
8.	Gloves are worn when needed.					
9.	Gloves do not show signs of excessive wear such as cracks, scrapes or lacerations, thinning or discoloration or break through to the skin.					
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Protective Clothing	1000				
10.	Protective clothing is worn by employees when required.					
	Hearing Protection	1.15 Tag	in a second			
11.	Noise hazardous areas are marked.					
12.	Employees are using earplugs or muffs when using noise hazardous equipment or working in noise hazardous areas.					
ļ i	Safety Glasses					
13.	Eye hazardous areas are marked or posted.					
14.	Employees use safety glasses when working in eye hazardous areas or working with eye hazardous equipment.					
REM	MARKS					

URS Corporation

URS Corporation Health & Safety Program

EYE AND FACE PROTECTOR SELECTION GUIDE



- 1. GOGGLES, Flexible Fitting, Regular Ventilation
- 2. GOGGLES, Flexible Fitting, Hooded Ventilation
- 3. GOGGLES, Custrioned Fitting, Rigid Body
- *4. SPECTACLES, Metal Frame, with Sideshields
- *5. SPECTACLES, Plastic Frame, with Skleshfelds
- *8. SPECTACLES, Metal-Plastic Frame, with Sideshicklis
- *7. WELDING GOGGLES, Eyecup Type, Tinted Lenses (businated)
- 7A. CHIPPING GOGGLES, Eyecup Type, Clear Safety London (Not Mustrated)
- *8. WELDING GOGGLES, Coverspec Type, Tinted Lenses (Blustrated)
- 8A. CHIPPING GOGGLES, Coverspec Type. Clear Safety Lenses (Not Illustrated)
- WELDING GOGGLES, Coverspec Type, Tinted plate Plate Lens
- FACE SHIELD, (Available with Plastic or Mesh Window)
- 11. WELDING HELMETS

	APPLICATIONS	;
OPERATION	HAZARDS	RECOMMENDED PROTECTORS Bold Type Numbers Slightly Preferred Protection
ACETYLENE-BURNING ACETYLENE-CUTTING ACETYLENE-WELDING	SPARKS, HARMFUL RAYS MOLTEN METAL, FLYING PARTICLES	7,8,9
CHEMICAL HANDLING	SPLASH, ACID BURNS, FUMES	2,10 (For severe exposure add 10 over 2
CHIPPING	FLYING PARTICLES	1,3,4,5,6,7A,8A
ELECTRIC (ARC) WELDING	SPARKS, INTENSE RAYS, MOLTEN METAL	9,11 (11 in combination with 4,5.6 in tinted lenses, advisable)
FURNACE OPERATIONS	GLARE, HEAT, MOLTEN METAL	7,8,9 (For severe exposure add 10)
GRINDING-LIGHT	FLYING PARTICLES	1,3,4,5,6,10
GRINDING -HEAVY	FLYING PAPTICLES	1,3,7A,8A (For severe exposure add 10)
LABORATORY	CHEMICAL SPLASH, GLASS BREAKAGE	2 (10 when in combination with 4,5,6)
MACHINING	FLYING PARTICLES	1,3,4,5,6,10
MOLTEN METALS	HEAT, GLARE, SPARKS, SPLASH	7,8 (10 in combination with 4,5.6 in tinted fenses)
SPOT WELDING	FLYING PARTICLES, SPARKS	1,3,4,5,6,10

^{*}Non-side shield spectacles are available for tmited hazard use requiring only frontal protection.



Health and Safety Program

Attachment 24-2

MEDICAL SURVEILLANCE EVALUATION

	Yes	No					
Biohazard	0	0	Does you job require work with bloodborne pathogens?				
Remediation	0	0	Do you perform heavy remediation construction activities, field CONSTRUCTION sampling or supervision activities at hazardous waste sites or HAZWASTE treatment, storage, or disposal (TSD) facilities which could expose you to hazardous substances above permissible exposure levels? (i.e. exclusion zone). If yes, how many days per year? 1-29 30+				
Field and Lab	0	0	Answer Yes if you do ANY of the following: a) work in a wet chemistry laboratory b) work on a pilot plant project c) conduct bench scale operations d) perform waste disposal activities e) perform field sampling (non-HAZWASTE)				

Distribution:	'
	☐ Supervisor,
	☐ Site Health and Safety Representative,
	☐ Medical Service Provider, WorkCare

D&MG SAFETY MANAGEMENT STANDARD

SANITATION

1.0 Applicability

This procedure applies to D&MG field operations.

2.0 Purpose and Scope

The purpose of this program is to provide employees on field assignments with appropriate personal hygiene facilities, including toilets, wash rooms and eating facilities, and to protect employees from unsanitary conditions.

3.0 Implementation

Field Activities- Implementation of this program is the responsibility of the Project Manager.

4.0 Requirements

- A. Arrange for the installation of adequate toilet and wash facilities during the planning stage of field projects. Note: Mobile crews having transportation readily available to nearby toilet facilities need not be provided with facilities.
 - 1. Provide job sites without sanitary sewer with one of the following:
 - a) Privies (where their use will not contaminate ground or surface water).
 - b) Chemical toilets.
 - c) Combustion toilets.
 - 2. Provide toilets for employees of each sex at field sites according to the following ratio:

Number of Employees	Minimum # of water closets (1)
1 - 15	1
16 - 25	2
36 - 55	3
56 - 80	4
81 - 110	5
111 - 150	6
Over 150	(2)

Footnote (1) where toilet facilities will not be used by women, urinals may be provided instead of the minimum specified.

Footnote (2) 1 additional fixture for each additional 40 employees.

- B. Provide a means for washing hands next to toilet areas.
- C. Arrange for fresh potable water to be available.
 - 1. Fixed Facilities

Require backflow prevention devices, testing and administrative controls to be used for all potable water supply branches.

- 2. Field Sites
 - a) Require an adequate supply of potable water to be available.
 - b) Water containers must be tightly closed and marked as to the contents. Containers must have a tap and be refilled daily.
- D. Maintain existing toilet and wash facilities.
 - 1. Maintain toilets and toilet area in good repair and in a clean and sanitary condition.
 - 2. Provide paper towels and soap or other suitable sanitizing material for washing hands.
 - 3. Locate hand-washing facilities next to or near toilets.
- E. Maintain availability and cleanliness of drinking water.
 - 1. Maintain backflow devices in a sanitary condition.
 - 2. Water coolers and water dispensers are to be kept in a sanitary condition and filled only with potable water.
 - 3. Provide fountain-type dispensers or one-use cups at each water dispenser.
- F. Maintain lunchrooms in a clean condition.
 - 1. Require microwave ovens to be used for food only.
 - 2. Require refrigerators that are designated for food storage to be used for food only.
 - 3. Do not allow workers to eat or store foods in areas where toxic materials are handled or stored.
 - 4. Periodically clean lunchrooms.

D&MG SAFETY MANAGEMENT STANDARD SANITATION

1.0 Applicability

This procedure applies to D&MG field operations.

2.0 Purpose and Scope

The purpose of this program is to provide employees on field assignments with appropriate personal hygiene facilities, including toilets, wash rooms and eating facilities, and to protect employees from unsanitary conditions.

3.0 Implementation

Field Activities- Implementation of this program is the responsibility of the Project Manager.

4.0 Requirements

- A. Arrange for the installation of adequate toilet and wash facilities during the planning stage of field projects. Note: Mobile crews having transportation readily available to nearby toilet facilities need not be provided with facilities.
 - 1. Provide job sites without sanitary sewer with one of the following:
 - a) Privies (where their use will not contaminate ground or surface water).
 - b) Chemical toilets.
 - c) Combustion toilets.
 - 2. Provide toilets for employees of each sex at field sites according to the following ratio:

Number of Employees	Minimum # of water closets (1)		
 	Water closets (1)		
1 - 15	1		
16 - 25	2		
36 - 55	3		
56 - 80	4		
81 - 110	5		
111 - 150	6		
Over 150	(2)		

Footnote (1) where toilet facilities will not be used by women, urinals may be provided instead of the minimum specified.

Footnote (2) 1 additional fixture for each additional 40 employees.

- G. Manage waste generated on site.
 - 1. Release sanitary sewage into sanitary sewer lines or to other proper disposal channels.
 - 2. Do not discharge hazardous waste into the sanitary sewer or storm sewer system.
 - 3. Collect garbage and trash daily.
 - a) Garbage containers located outside buildings should have lids and remained closed. Transport garbage offsite at least weekly.
 - b) At remote field sites where bears and similar wild animals are a hazard, remove garbage from the site daily (do not let garbage remain on site overnight).
- H. Prevent pests and vermin from multiplying on site. Eliminate unsanitary conditions that propagate insects or vermin.
- Inspect work sites using checksheet provided as Attachment 30-1 for compliance at the beginning of the project and mid -project.

5.0 Documentation Summary

File completed inspection sheets in the Project Safety File.

6.0 Resources

- A. U.S. OSHA Construction Standard Sanitation 29 CFR 1926.51 (http://www.osha-slc.gov/OshStd_data/1926_0051.html)
- B. U.S OSHA General Industry Standards Sanitation 29 CFR 1910.141 (http://www.osha-slc.gov/OshStd_data/1910_0141.html)
- C. National Interim Primary Drinking Water Regulations 40 CFR 141 (http://www.access.gpo.gov/nara/cfr/waisidx/40cfr141.html)
- D. Queensland Workplace Health and Safety -Code of Practice for Construction Project Amenities (http://www.detir.qld.gov.au/hs/advisory/adv013v1.pdf)



SANITATION INSPECTION SHEET

Location:		200 MO:	Job No:			
Dat	e Inspected: Name of Inspector:		· 			
	Note: All "No" notations must be corrected		Yes			
	a Loiletsi 2					
1.	Are there an adequate number of toilets on site?	-				
	1 - 15 employees = 1 toilet 16 - 35 employees = 2 toilets		ļ			
	36 - 55 employees = 2 toilets					
	56 - 80 employees = 4 toilets					
	81 - 110 employees = 5 toilets					
2.	Toilets are in clean condition.					
3.	Toilet paper is provided.					
4.	Toilet areas are clean and sanitary.					
	HandiWashing Facilities			2000年		
5	Hand washing facilities are provided near toilets.					
6	Paper towels and soap are provided.	- 				
	Drinking Water			提出型		
7.	Drinking water is provided on site.					
8.	Disposable cups are provided or fountain type dispenser is provided.					
9.	Drinking water containers are kept clean and tightly closed or covered	1				
建設	Lunch Rooms		经上海	是阿里		
10.	Lunch rooms or eating areas are kept clean.					
11.	Microwaves are used for food only.					
12.	Microwave ovens are kept clean.					
13.	Refrigerators are kept clean.					
14.	Refrigerators are used to store food only.					
18	Vermin			35 337.74		
15.	Rats, mice and other vermin are not living within buildings.	·- -				
16.	Cockroaches and fleas are not thriving within buildings.					
L	Cockroaches and fleas are not thriving within buildings. MARKS					

D&MG SAFETY MANAGEMENT STANDARD SCAFFOLDING

1.0 Applicability

This procedure applies to D&MG projects where scaffolding is used.

2.0 Purpose and Scope

The purpose of this procedure is to require the proper construction, use, maintenance and inspection of scaffolding on D&MG project sites.

3.0 Implementation

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

A. Pre-job Planning

- Determine the need for stationary scaffolding at the proposal stage of the project for activities that cannot be safely conducted from the ground or from solid construction, except short period work as can be done safely from properly secured ladders.
- 2. Contract for the services of a scaffold erection company that will be responsible for:
 - a) Erection.
 - b) Moving.
 - c) Dismantling.
 - d) Certification for use by an appropriately qualified competent person.
- 3. Job built scaffolding is prohibited.

B. General

- 1. Prohibit access to scaffolding until the Scaffolding Erection Competent Person has inspected the scaffolding and certified that it is ready for use and has hung a "Ready for Use Tag" with his/her signature.
- 2. Conduct pre-shift evaluations of the scaffolding using the format at Attachment 31-1.

- 3. Obtain erection contractor certification that scaffolds and components are able to support at least four times the intended load.
- 4. Require that standard guard rails and toeboards have been installed on all open sides of the scaffold.

5. Verify that:

- a) The platform is tightly planked for the full width of the scaffold.
- b) Planks extend over the end supports between 6 inches (15 cm) and 12 inches (30 cm).
- c) Cleats are used on the bottom edges to prevent slippage.
- d) The planking is scaffold grade (planks must be stamped on end).
- e) Access has been provided through the use of properly designed stair towers or hook on attachable ladders.
- f) Scaffold is adequately tied into structure.
- 6. Prohibit climbing on frame members for access.
- 7. Make sure the legs or uprights of scaffolds are plumb and rigidly braced to prevent swaying.
- 8. Provide overhead protection for workers on a scaffold exposed to overhead hazards.
- 9. Never use shore or lean-to scaffolds.

C. General Use Work Practices

- Scaffolds shall be cleaned off upon completion of work by the craft using the scaffold.
- 2. A toe board should never be used to aid access to a working platform; grab bars should be used instead.
- 3. Require that tools, materials, and debris do not accumulate in quantities that create a hazard.
- 4. Remove any snow, ice, or slippery conditions prior to access by employees.
- 5. Prohibit use during high winds and storms.
- 6. Modifications or alterations are to be performed only by competent persons.

- 7. Appoint appropriately qualified competent person to inspect daily prior to use.
- 8. Deny access until all deficiencies have been corrected.

D. Rolling Scaffold

- 1. Do not use rolling scaffolds that extend to a height more than four times the minimum base dimension.
- 2. Maintain floor level within 3° of level.
- 3. Lock wheels when workers are on the scaffold.
- 4. Prohibit workers from riding scaffolds when they are being moved.
- 5. Secure tools and materials so they cannot fall or roll off when the scaffold is moved.
- 6. Require guardrails and planking on all rolling scaffold above 6 feet (2 metres).
- 7. Never allow the use of ladders from the planking/floor of rolling scaffold.

5.0 Documentation Summary

Retain in the Project Safety File:

- A. Qualifications of Scaffold Erection Competent Person
- B. Qualifications of Scaffold Daily Inspection Competent Person
- C. Daily scaffolding inspection reports

6.0 Resources

- A. National Association of Demolition Contractors (http://www.demolitionassn.com)
- B. U.S. OSHA Standard Scaffolds 29 CFR 1926 Subpart L (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_L.html)
- C. U.S. OSHA Technical Links Scaffolding (http://www.osha-slc.gov/SLTC/scaffolding/index.html)
- D. ANSI A 10.8-1987 (http://www.ansi.org/cat_top.html)
- E. Australian Standards AS/W2S 1576.1 to .5 Scaffolding



D&MG Health & Safety Program SCAFFOLD INSPECTION CHECKLIST

L	ocation:		
C	Pate Inspected: Name of Inspector:		
		.∵Yes∖	No
	General		
1.	Erected under proper supervision.		
2.	All structural members adequate for use.		{
3.	All connections adequate, pins and crossbracing provided and supports plumb.		
4.	Proper footings provided, sound, rigid and secure.		
5.	Safe tie-in to structure.		
6.	Access ladder provided and used.		
7.	Defective and damaged parts removed from service.		
8.	Ladders and working areas kept free of debris, ice, snow, chemicals and grease.		
9.	Platform complete, planks close together, overlapped at least 12", secured or cleated.		
10.	Guardrails, midrails, and toeboards installed on all open sides of platforms 6 feet or over in height.		
11.	Passerby and overhead protection provided as required.		
12.	Frequent inspections conducted.		
RE	MARKS		
<u> </u>			
Sig	nature		

D&MG SAFETY MANAGEMENT STANDARD WORK ZONE TRAFFIC CONTROL

1.0 Applicability

This procedure applies to D&MG field operations involving work performed on roads, highways, and similar areas where motor vehicles may be a hazard.

2.0 Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with work performed on or next to highways and roads.

3.0 Implementation

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4.0 Requirements

- A. Review the project in the planning phase to determine if any work will be performed on or adjacent to any road that will disrupt normal traffic flow.
- B. Hire a qualified contractor or have an in house Competent Person devise a traffic control plan based on the work to be performed.
 - 1. Competent persons are those who are knowledgeable about the fundamental principles of temporary traffic control and the work activities to be performed.
 - 2. Traffic control plans will be designed to meet requirements as set in the Manual on Uniform Traffic Control Devices (MUTCD) (Resource A) as well as those rules set by state, county and cities in which work is performed.
 - 3. Require that the plan is commensurate with the complexity of the project.
- C. Submit the traffic control plan to the road authority for approval.
 - 1. Submissions will be made to the state department of transportation or highways if state or federal highways are impacted as well.

- 2. Local county representatives.
- 3. Local city representatives, if within city limits.
- 4. For U.K. operations, submittal is to be made to County Council or local authority.
- D. Decide whether to have qualified in house personnel or contract personnel implement the traffic control plan in the field.
 - 1. Certified flaggers may set up work zones.

Flaggers must attend an eight-hour work zone traffic control course as taught by an ATSSA certified instructor (or equivalent).

- 2. Obtain appropriate traffic control equipment as described in Resource A.
- 3. For U.K. operations, all operatives must be trained in accordance with 'New Road and Street Works' Act.
- E. Execute the traffic control plan developed for the job site. Require all personnel who work on/or adjacent to the roadway to wear bright orange, strong yellow-green or fluorescent versions of these colors of approved work zone clothing, including:
 - 1. Vests, at a minimum.
 - 2. Coveralls, if desired.
 - 3. Rainwear or other apparel as needed.
- F. Require a Competent Person who is certified as a Worksite Traffic Supervisor supervises flaggers at least once a day.
- G. Develop a plan for the periodic inspection and maintenance of the Traffic Control Zone utilizing Attachment 32-1.

5.0 Documentation Summary

Records required in the Project Safety File:

- A. Copies of traffic control plans used on site.
- B. Training certificates for D&MG flaggers and Competent Persons.

- C. Qualifications of contracted flaggers and Competent Persons.
- D. Inspection records.

6.0 Resources

- A. Part VI of the Manual on Uniform Traffic Control Devices (MUTCD) (http://www.ohs.fhwa.dot.gov/devices/mutcd.html)
- B. American Traffic Safety Services Association (http://www.atssa.com/)
- C. ATTSA Flagger Train the Trainer Program (http://www.flagger.com/)
- D. U.K. Section 7, Road Traffic Act
- E. U.K. 'New Road and Street Works' Act
- F. Australian Standards SAA HB81.1-.5 Field Guide for Traffic Controls at Work on Roads
- G. Australian Standards AS1742 Manual of Uniform Traffic Control Devices
- H. Australian Standards SAA HB69.13-1995 -Guide to Traffic Engineering Practice - Pedestrian
- Queensland Workplace Health and Safety A Guide to Preparing Workplace Health and Safety Plans for Worker Safety
 Within Road Reserves
 (http://www.detir.qld.gov.au/hs/guide/gde26.pdf)



D&MG Health & Safety Program TRAFFIC CONTROL INSPECTION CHECKLIST

Pro	ject Name:	 Projec	t Num	nber:			
ltër		Yesi	MNoti	SHEW THE	How!N	lany?	WHEE
1.	Are any devices missing?						
	Do any devices need repair?						
	Were all replaced or repaired?						
2.	Are any lights (flashers, etc.) not functioning?						
	Were they all replaced or repaired?						
3.	Are any devices improperly placed?					R_ _	
	Were all positions corrected?						
4.	Do any devices need cleaning?						
	Were all devices cleaned?		}				
	e above check was completed by:		(nam	ne/title)	□a.m	. □ p.m	
	(date)		(time	e)		•	

D&MG SAFETY MANAGEMENT STANDARD UNDERGROUND STORAGE TANK REMOVAL

1.0 Applicability

This procedure applies to D&MG field operations where underground storage tanks (USTs) are removed.

2.0 Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with UST removal. UST removal work includes excavation, product removal, purging, ventilating, inerting, cutting, and tank lifting.

3.0 Implementation

Implementation of this program is the responsibility of the Project Manager. The Project Manager is responsible for:

- A. Identifying UST hazards on their projects prior to the start of work.
- B. Requiring a site safety and health plan, which includes a hazard assessment, for the UST work has been prepared.
- C. Acting as or appointing a Site Safety Officer (SSO) qualified to assess UST hazards and specify and enforce control requirements. The SSO is to be a person who has experience and training in:
 - 1. All aspects of UST removal procedures.
 - 2. Evaluation of UST hazards.
 - 3. Calibration and operating of air monitoring instruments.
 - 4. UST hazard control measures.
- D. Providing the necessary equipment to safely complete work.
- E. Verifying that employees exposed to UST hazards have received required training.

4.0 Requirements

A. Pre-Excavation Procedures

- 1. The SSO is to visually inspect the site to evaluate whether the work can be safely done. Special attention must be given to safe work surfaces for equipment, the presence of overhead lines which may hinder equipment operation, and local traffic which may be affected.
- 2. Call the local utility companies to locate telephone, power, water and sewer lines which may be in the way of excavation. Require that they be well marked before excavation.
- 3. Locate the tank, together with piping, vents, and manways.
- 4. Sample the tank to verify that the tank contains the product which was indicated. Note liquid levels. Check for the presence of water and other contaminants.
- 5. Test the tank vapor space with a Combustible Gas Indicator/Oxygen meter (CGI/O₂) to verify safe/unsafe conditions.

B. Tank Excavation

- 1. Establish the boundaries of the exclusion zone so that unprotected personnel will not accidentally come in contact with any possible liquid splashes or vapors arising from the excavation.
- 2. Maintain all walking/working surfaces and areas in a safe condition. A firm footing for equipment and personnel must be established on the spoils pile. If not, the areas need to be stabilized.

If it is possible for excavation or hoisting equipment to come within 15 feet of overhead power lines, then these will need to be de-energized prior to beginning operations. (Refer to SMS 34, "Utility Clearances").

Note that for tracked vehicles, the proper alignment with an excavation is to have the tracks perpendicular to the excavation.

3. Designate a proper storage area for the overburden that is being removed if free product or saturated soil is likely to be contacted. This area may need to be lined and diked. If free product or saturated soils are found, both toxic and flammable readings shall be taken at the work site and perimeter.

- 4. Slope or shore walls of excavation to prevent collapse. Remember that an excavation over 4 feet deep has the capability of containing a hazardous atmosphere. (Refer to SMS 13, "Excavation Safety")
- 5. Set proper barricades and warning signals for unattended excavations to warn all personnel of the open pit hazard. In otherwise uncontrolled areas, additional security measures must be instituted in the form of fences or security guards.

C. Tank Removal

- 1. All products will be removed by pumping (if possible).
- 2. Inert tank prior to removal if the tank atmosphere is flammable. Follow guidance in "Closure of Underground Petroleum Storage Tanks," American Petroleum Institute Recommended Practice 1604, 1996.
- 3. Remove all lines by disconnecting joints rather than cutting or burning. No hot work will be performed without a hot work permit issued after LEL testing.
- 4. The tank will then be carefully lifted and moved to the decontamination area for decontamination. Appropriate rigging equipment must be used to lift the tank from the excavation. (Refer to SMS 38, "Cranes" and SMS 41, "Rigging")

(note: the shears should not be used for lifting, but only for cutting the tank since the weight of the shears approaches the maximum lifting capacity of many excavators.)

D. Tank Decontamination

- 1. Designate the tank decontamination area as an exclusion zone. Require that proper personal protective equipment, medical emergency equipment, splash shower, and eye wash are available.
- 2. Check tank atmosphere again before opening the tank to permit entry for water blasting, foaming, or other cleaning. Inert or ventilate as applicable. Confined space entry procedures apply for any entries.
- 3. Personnel will wear chemically protective suits with respiratory protection appropriate to the hazards.
- 4. Establish a method for rinse water containment and proper disposal procedures.

E. Safety Certification Before Cutting Tanks

- 1. The preferred method of cutting (rendering) tanks is to use the power shears attached to a boom vehicle. The least preferred method is to use a cutting torch. A power metal chisel may also be used. The primary hazard when cutting tanks, using either the shears, cutting torch, or chisel is the possibility of igniting flammable vapors in the tank. When using the shears, the possibility of catapulting metal pieces must also be considered.
- 2. Remove all unnecessary personnel from area where tanks are cut. The possibility of explosion of flammable vapors should always be considered.
- 3. Sample the tank atmosphere for flammables and oxygen. Before a tank can be cut with either shears, cutting torch, or chisel, the tank atmosphere must be less than 10 percent LEL or less than 8 percent oxygen.

Follow API procedures.

4. BEFORE ANY HOT WORK IS PERFORMED, A HOT WORK PERMIT MUST BE COMPLETED IN ACCORDANCE WITH SMS 20, "HOT WORK".

5.0 Documentation Summary

Records required in the Project Safety File:

- A. UST Supervisor qualifications.
- B. Excavation permits.
- C. Daily UST inspections.
- D. Air testing logs.
- E. Hot work permits (where necessary).
- F. Confined space entry permits (where necessary).
- G. Daily work briefing documentation.

6.0 Resources

- A. U.S. OSHA Standard Fire Protection -29 CFR 1926 Subpart F (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_F.html)
- B. U.S. OSHA Standard Materials Handling, Storage, Use, and Disposal 29 CFR 1926 Subpart H (http://www.osha-slc.gev/OshStd_toc/OSHA_Std_toc_1926_SUBPART_H.html)

- C. U.S. OSHA Standard Welding and Cutting 29 CFR 1926 Subpart J (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_J.html)
 D. U.S. OSHA Standard Excavations 29 CFR 1926 Subpart P (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_P.html)
- E. USACE EM 385-1-1 Sections 9, 10, 14, 15, and 25 (http://www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1/toc.htm)
- F. American Petroleum Institute Standard 2015, Safe Entry and Cleaning of Petroleum Storage Tanks, 1994 (http://www.cssinfo.com/apigate.html)
- G. American Petroleum Institute Recommended Practice 1604, Closure of Underground Petroleum Storage Tanks, 1996 (http://www.cssinfo.com/apigate.html)

1. Applicability

This procedure applies to URS projects where personnel may encounter subsurface or overhead utilities.

2. Purpose and Scope

Many field activities are conducted near aboveground and underground utilities. The primary purpose of this Standard is to establish operating requirements that will permit employees to work safely in the vicinity of electrical, natural gas, fuel, water, and other utility systems and installations. The secondary purpose is to prevent economic damage to utility systems from operations associated with project-related activities.

The term "utility clearance" includes

- A. The positive locating of utility systems in or near the work area.
- B. A signed statement by an appropriate representative attesting to the location of underground utilities and/or the positive de-energizing (including lockout) and testing of electrical utilities.

Note that in some cases, utility representatives may deem it appropriate or necessary to use insulating blankets to isolate a power line; this is an acceptable alternative to positive de-energizing (only utility representatives can make the determination).

"Contact" with overhead power lines is considered to occur when equipment is closer to power lines than permitted by the criteria in the table in Section 4.0.C.2.b below. (see note for U.K. operations).

3. Implementation

Field Operations - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Time for Completion

Complete utility clearances prior to the start of any work in the area of the utility that could feasibly result in contact with or damage to that utility.

B. Local Regulations

Research local codes and regulations regarding utility locating and isolation requirements. Utility companies and locating services are among the appropriate resources.

C. Overhead Power Lines

Proximity to Power Lines

No work is to be conducted within 50 feet (15 meters) of overhead power lines without first contacting the utility company to determine the voltage of the system. No aspect of any piece of equipment is to be operated within 50 feet (15 meters) of overhead power lines without first making this determination.

- 2. Operations adjacent to overhead power lines are **PROHIBITED** unless one of the following conditions is satisfied:
 - a. Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.
 - b. The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked so that no part, including cables, can come within the minimum clearances shown in the table.

MINIMUM DISTANCES FROM POWERLINES					
Powerlines Nominal System kV	Minimum Required Distance				
0-50	10 feet (3 meters)				
51-100	12 feet (3.6 meters)				
101-200	15 feet (4.6 meters)				
201-300	20 feet (6.1 meters)				
301-500	25 feet (7.6 meters)				
501-750	35 feet (10.7 meters)				
751-1000	45 feet (13.7 meters)				

Note: for U.K. operations, the specific safe distance is determined by the utility company.

c. The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine

the minimum safe operating distance; get this determination in writing with the utility representative's signature.

3. All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the Project Manager prior to the start of work.

D. Underground Utilities

- 1. Do not begin subsurface work (e.g., trenching, excavation, drilling, etc.) until a check for underground utilities and similar obstructions has been conducted. The use of as-built drawings must be confirmed with additional geophysical or other survey.
- 2. Contact utility companies or the state/regional utility protection service at least two (2) working days prior to excavation activities to advise of the proposed work, and ask them to establish the location of the utility underground installations prior to the start of actual excavation.
- 3. Obtain utility clearances for subsurface work on both public and private property. Clearances are to be in writing, signed by the party conducting the clearance.
- 4. Protect and preserve the markings of approximate locations of facilities until the markings are no longer required for safe and proper excavations. If the markings of utility locations are destroyed or removed before excavation commences or is completed, the Project Manager must notify the utility company or utility protection service to inform them that the markings have been destroyed.
- 5. Do not conduct mechanical-assisted subsurface work (e.g., powered drill rig, mechanical excavator, etc.) within five (5) feet (1.5 meters) of a confirmed or suspected utility or other subsurface structure. Confirm minimum distances for mechanical-assisted subsurface work with the utility owner, as distances beyond this five foot minimum may be required.
- 6. Subsurface work within five feet (1.5 meters) of a confirmed or suspected utility or other subsurface structure must be done by hand (e.g., hand auger, shovel) to the point where the obstruction is visually located and exposed. Once the obstruction location is confirmed in this manner, mechanical-assisted work may commence.

7. Reference <u>SMS 13</u>, "Excavation Safety" for additional information regarding subsurface operations.

E. Training

Conduct a site briefing for site employees regarding the hazards associated with working near the utilities and the means by which the operation will maintain a safe working environment. Detail the method used to isolate the utility and the hazards presented by breaching the isolation.

5. Documentation Summary

File these records in the Safety Filing System:

- 1. Documents requesting utility clearance.
- 2. Documents confirming utility clearance.
- 3. Training/briefing documentation of each isolation.

6. Resources

- 1. Utility Locating Services (typically under "Utility" in the Yellow Pages)
- NIOSH Alert Preventing Electrocutions from Contact Between Cranes and Power Lines (http://www.cdc.gov/niosh/crane.html)
- 3. One Call Utility Locating List (http://www.underspace.com/refs/ocdir.htm)
- 4. National Utility Locating Contractor's Association (http://www.underspace.com/nu/index.htm)
- 5. U.K. Health and Safety Executive GS6

D&MG SAFETY MANAGEMENT STANDARD

WORK AT HIGH ALTITUDE

1.0 Applicability

This procedure applies to D&MG field operations where work is conducted at altitudes in excess of 7000 feet.

2.0 Purpose and Scope

The purpose of this procedure is to provide sufficient information to conduct work safely at high altitudes. This program provides information about risks encountered while traveling to and working at high altitudes, signs and symptoms of high altitude illnesses and illness prevention strategies. Also included are actions to take in the event of illness.

3.0 Implementation

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4.0 Requirements

A. Pre-Travel

- 1. Before travel to and conducting work at altitudes of 7000 feet or more, review this procedure with all affected employees.
- 2. Conduct pre-project orientation covering the recognition and prevention of high altitude illnesses with all workers scheduled to work at 7000 feet or higher. High altitude illnesses are described in Attachment 35-1.
- 3. All employees who conduct work at 7000 feet or more must be medically cleared to do so. Obtain medical clearance for each employee from the Division's Medical Surveillance Administrator.
- 4. Plan travel so that the rate of ascent is slow. **Slow ascent** is the cornerstone of effective acclimatization thereby preventing serious illness. Avoid sleeping above 10,000 feet the first night at altitude. Increase sleeping altitude nor more than 1000 feet per day. Spend an extra day for each 3000 feet gained.
- 5. Plan for at least two workers at all times at high altitude. **No working** alone.

 Obtain International SOS/AEA Medical Emergency Evacuation Cards for each worker from the Division's Medical Surveillance Administrator

B. Prevention

- 1. Follow pre-travel strategies listed in Section A. SLOW ASCENT.
- 2. Nutrition: While at high altitude, eat a moderate carbohydrate diet (whole grains, fruits, vegetables). Carbohydrates are the most efficient fuel for the body because they can be broken down to produce energy almost instantly. Avoid excess dietary salt.
- 3. Be aware of abnormal symptoms in yourself and others.
 - a) Self: Resting pulse over 110, shortness of breath at rest, loss of appetite, unusual fatigue while walking.
 - b) Others: Skipping meals, anti-social behavior, the last person to arrive at the destination.
- 4. Drug Therapy

Drug therapy must be coordinated through a physician familiar with altitude related conditions and the appropriate treatments.

5.0 Documentation Summary

- A. File these records in the Office Safety File:
 - 1. Medical Clearance forms for all project workers
- B. Maintain these records in the Project Health and Safety File
 - 1. Medical Clearance forms for all project workers
 - 2. Medical Emergency Evacuation Plan
 - 3. Employee briefing documentation
 - 4. International SOS/AEA Evacuation Cards

6.0 Resources

- A. Travel Medicine Clinics (http://healthlinks.washington.edu/clinical/travelmed.html)
- B. Medical College of Wisconsin Health Link Altitude Sickness (http://healthlink.mcw.edu/content/article/907195877.html)

 C. American Heart Association High Altitude (http://207.211.141.25/Heart_and_Stroke_A_Z_Guide/higha.html)
- D. Center for Disease Control (http://www.cdc.gov/)



DMG Health & Safety Program HIGH ALTITUDE ILLNESSES

- 1. Acute Mountain Sickness (AMS)
 - a) Begins a day or two after arrival at altitude, can occur as low as 7000 feet and effects most people above 10,000 feet.
 - b) Signs and Symptoms
 - (1) Mild: headache, lack of energy, nausea, dizziness, weakness (exactly like a hangover).
 - (2) Moderate: vomiting, unrelieved headache, low urine output.
 - (3) Severe: ataxia (incoordination: test by unaffected individual observing affected worker while tandem walking), altered consciousness, localized rales (sounds of fluid in the lungs) and cyanosis.
 - c) Treatment
 - (1) Persons with mild or moderate symptoms should not ascend farther. Sometimes, one or two nights' rest at the same altitude will alleviate symptoms and continued ascent may by undertaken with caution.
 - (2) Anyone with severe symptoms should descend immediately and seek medical attention.
- 2. High Altitude Pulmonary Edema (HAPE)
 - a) Abnormal accumulation of fluid in the lungs. Often misdiagnosed as pneumonia. Dehydration and hypothermia compound the symptoms.
 - b) Often occurs in the middle of the night or upon awakening.
 - c) Age and physical fitness are not significant predicting factors.
 - d) Occurs more often in group activities due to peer pressure and tight schedules.
 - e) Best predictor for subsequent problems is a history of altitude illness.
 - f) Signs and Symptoms
 - (1) Early: dry cough, decreased exercise performance, slight tachycardia (rapid heart beat), rales (sounds of fluid in the lungs).
 - (2) Serious: extreme difficulty with breathing at rest, cyanosis (blue, gray, or purple discoloration of the skin), rapid breathing, rales (sounds of fluid in the lungs). Can progress to coma.

g) Treatment

Descent, evacuation, and medical treatment are mandatory. Individual should be carried down and kept warm. Give high-flow oxygen if available.

3. High Altitude Cerebral Edema (HACE)

- a) Usually occurs several days after the onset of mild AMS (Acute Mountain Sickness).
- b) Signs and Symptoms
 - (1) Incoordination.
 - (2) Decreased mental status.
 - (3) Severe exhaustion progressing to stupor and coma.
 - (4) Headache, nausea, vomiting.
 - (5) HAPE often accompanies HACE.
 - (6) Hallucinations, slight paralysis of one side of the body.

c) Treatment

- (1) Descent and administration of oxygen.
- (2) Evacuation and medical treatment.

D&MG SAFETY MANAGEMENT STANDARD REMOTE TRAVEL HEALTH & SAFETY

1.0 Applicability

This program applies to D&MG personnel traveling to conduct project related work in remote locations and developing countries.

2.0 Purpose and Scope

The purpose of this program is to protect employees from communicable and non-communicable diseases that may be encountered in the work environment and provide travel safety information when travelling to developing countries.

3.0 Implementation

Office and Field Locations Implementation of this program is the responsibility of the employee and the Project Manager.

4.0 Requirements

A. Travel Health

The goal of the travel health program is to maintain employee health status while traveling and working in developing countries and remote environments. Components include project planning, trip preparation, and personal safety.

1. Project Planning

- a) Coordinate the following activities with the Division's Medical Surveillance Administrator:
 - (1) Prior to travel to developing countries or remote environments determine the necessary disease prevention strategies for all locations to be visited.
 - (2) Employees who are scheduled to conduct the work must be medically cleared BEFORE travel.

- (3) Obtain a medical emergency evacuation card (International S.O.S./AEA).
- (4) Schedule required immunizations as soon as the project is awarded. Some immunizations require several injections spread over several weeks and sometimes months to obtain adequate protection.
- b) Review Attachments 36-1, 36-2, and 36-3 regarding illness prevention with staff as appropriate.
- c) Prepare personal and project first aid kits before traveling.

2. After Return

- a) Continue taking anti-malarial medication, if applicable, for 4 weeks after return.
- b) Consult a physician if any of these symptoms occur after return: fever, abdominal pain, diarrhea, weight loss, fatigue, cough, skin rash.

B. Travel Safety

- 1. Accidents are the leading cause of death for travelers, therefore constant attention to safe behavior is in order. Following the recommendations below will decrease chances of having an accident while traveling.
 - a) Preventing Traffic Accidents
 - (1) Hire a qualified driver or guide.
 - (2) Drive only when you are in good physical condition (not tired, hungover, drunk, etc.).
 - (3) Try not to drive at night.
 - (4) Rent a larger rather than smaller vehicle.
 - (5) Wear your seat belt.
 - (6) Be sure you are covered by collision and liability insurance.
- 2. Verify country security status with the State Department and with local contacts before travel.

3. Personal Safety

- a) Avoid small nonscheduled airlines in developing countries.
- b) Don't travel at night.
- c) Carefully select swimming areas and don't swim alone. In many developing countries, serious diseases are contracted by swimming in streams so swim only in chlorinated swimming pools.
- d) Lock your hotel room at all times.
- e) Review hotel fire safety rules and locate the nearest exits.
- f) Keep valuables and travel documents in the hotel safe.
- g) Avoid politically unstable regions where there is civil violence or drug related violence.
- h) Keep a photocopy of your passport in a separate location from your original and leave a copy at home.
- i) If you wear prescription glasses/contacts, take an extra pair.
- j) Use a money belt or a concealed money pouch for passports, cash and other valuables.
- k) Use official taxis rather than street taxis, as illegal taxis can be decoys for robbers.
- 1) Whenever possible, do not travel alone.

5.0 Documentation Summary

File in Office Safety Files

- A. Medical clearance forms for each employee
- B. Signed briefing form documenting Disease Prevention strategies

6.0 Resources

A. "Health Information for International Travel". U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, Atlanta, GA 30333

- B. Centers for Disease Control and Prevention Traveler's Health Hotline (404) 332-4559, Fax Information line (404) 332-4565
- C. United States Department of State Citizens Emergency Center (202) 647-5225
- D. CDC Travel Information (http://www.cdc.gov/travel/index.htm)
- E. World Health Organization (http://www.who.ch)
- F. U.S. State Department Travel Warnings and Consular Information Sheets (http://travel.state.gov/travel_warnings.html)
- G. Lonely Planet Traveler's Guides (http://www.lonelyplanet.com/dest/dest.htm)



DMG Health & Safety Program

REMOTE TRAVEL HEALTH & SAFETY FOOD-BORNE DISEASE PREVENTION

The overall goal is to prevent food-borne illness such as salmonellosis, shigellosis, botulism, etc. Remote projects which are based in work camp environments must have food service contractors/handlers who operate under internationally acceptable food sanitation standards. A Health Plan must be prepared which addresses food sanitation strategies and evaluation methodologies.

Food should be considered the main source of enteric illness if it occurs. Incubation periods vary from 2 to 48 hours for various pathogens and toxins, so it can be difficult to implicate a particular meal. The recommendation "boil, peel it, or forget it" is based on theory. Appearances can be deceiving. The nature of food sanitation services is such that they require a commitment to continuous inspection, correction, and prevention. Therefore, constant, daily scrutiny and evaluation are required. Remote work facilities are particularly vulnerable to food sanitation breakdowns due to several factors:

- 1. Remote locations which require extensive food transport.
- 2. Relatively hostile ambient environment (i.e., hot, humid with intrinsically large pre-existing reservoirs of insects and pests).
- 3. Dependence on local food preparation subject to: a) non-US standards of hygiene/sanitation, b) possible training and/or educational deficiencies in basic sanitary practices, and c) baseline medical problems (e.g., hepatitis, salmonella carrier status).
- 4. All work camp residents receive food and water support from the same sources; therefore a problem will potentially affect the entire camp.
- 5. Unlike water/sewage services, food supply services are people dependent and cannot be controlled, maintained, and secured by a unique engineering fix.

Prevention

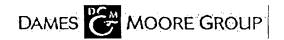
Listed below are general guidelines for prevention of food-borne illness. For project specific assistance contact the Division Medical Surveillance Administrator.

- 1. Wash hands frequently, and particularly before eating.
- 2. Order foods that are cooked individually for you. High risk foods are typically those that are cooked once during the day and the served later, such as lasagna, quiche, casseroles, etc. A fly landing on a warm lasagna in the late morning could deposit bacteria that could double every 20 minutes until you eat a piece 8 hours later.
- 3. At all times, including storage, preparation, display, serving, or transportation, food must be protected from sources of potential contamination. This includes dust, insects, rodents, unclean equipment and utensils, unnecessary. handling, coughs, sneezes, flooding, overhead leakage or drippage from condensation. The temperature of potentially hazardous food must be maintained at 45 degrees F or below, or at 140 degrees. F or above at all times. Remote work camps which rely on generator produced electricity must have adequate electrical coverage for maintaining these temperatures. If no generators are utilized, potentially hazardous foods must be obtained in a dehydrated or canned form.
- 4. The food preparation process should involve: 1) strict adherence to personal hygiene measures by all food handlers, 2) using appropriate cooking and reheating procedures that destruct pathogens, 3) thorough cleansing of all raw food products which will be consumed uncooked, 4) minimal handling of all food products before, during, and after preparation.
- 5. Insects and rodents are capable of transmitting diseases to personnel by contamination of food and food-contact surfaces. Therefore, food products must be stored in insect/rodent free environments. At work camp sites, both preventive and corrective measures are required since ongoing contact between pests and food products can easily occur.
- 6. To control food-borne illness and prevent food spoilage, the sources from which foods are obtained must be a concern. For example, meat products may be obtained from local village slaughterhouses. Work practices and environmental controls during these slaughter operations may not conform with acceptable food safety standards. Bacterial contamination can easily occur and become a source

of future acute illness. This type of problem can be prevented or minimized by appropriate types of refrigerated transportation containers or vehicles.

7. Food products are least protected during food preparation processes, due to handling involved. Once food is contaminated, improper cooking, reheating or

cooling procedures permit the survival and growth of pathogenic microorganisms. Kitchenware and food contact surfaces should be washed, rinsed, and sanitized after each use. The food contact surface of grills, griddles, etc. should be cleaned at least once a day. Non-food contact surfaces should be cleaned as necessary to keep them free of dust, dirt, food particles, etc. Cloths used for wiping food spills on tableware should be clean, dry, and used for no other purpose. Cloths or sponges used for wiping food spills on kitchenware and equipment surfaces should be clean and rinsed frequently in a sanitizing solution, and should be stored in the solution between uses.



DMG Health & Safety Program

REMOTE TRAVEL HEALTH & SAFETY WATER-BORNE DISEASE PREVENTION

The overall goal is to prevent water related diseases caused by organisms such as giardia, E. coli, etc. Water can be purified in 3 main ways; by heat, by chemical treatment, and by filtration. How effective these ways are depends on what is likely to be in the water in the first place.

- 1. Heat Water that has been brought to a boil is safe to drink. It doesn't have to boil for any particular length of time, nor does the altitude at which water is boiled affect this advice. Simply bringing water to a boil is sufficient to kill enteric pathogens which cause diarrhea or other illnesses. These organisms all begin to die at about 140 degrees F, and the length of time it takes to bring a quantity of water from 140 to boiling, and then cool off enough to drink is more than enough to get rid of these organisms. However, to sterilize water for the purposes of intravenous administration or surgical irrigation, it is necessary to boil it for up to twenty minutes due because spores of mostly anaerobic bacteria can survive heat to a substantial degree.
- Chemical Cryptosporidium, which causes Cryptosporidiosis (a diarrheal disease), is completely resistant to iodine and chlorine disinfection in any drinkable doses. The newly discovered Cyclospora may also be resistant to iodine. If these organisms are not present in this environment, chemical disinfection can be considered.
- 3. Filtration Bacteria are filterable with a filter of 0.2 microns. Giardia and Entamoeba histolytica are much larger and are filtered with a 5 micron filter. Viruses, however, are so small that a filter capable of trapping them would not be large enough to allow any water to pass. Filters may be a way of handling brackish water prior to boiling, but the filter would become clogged rapidly.

In some countries swimming or wading in lakes and streams can create diseases such as schistosomiasis, filariasis, etc. If the risk is present, do not swim or wade in any lakes, streams, or other surface water body. Don't walk around barefoot and keep dry.

D&MG SAFETY MANAGEMENT STANDARD UNEXPLODED ORDNANCE/CHEMICAL WARFARE MATERIALS

1.0 Applicability

This procedure applies to D&MG projects where unexploded ordnance (UXO) and/or chemical warfare materials (CWM) are known or reasonably expected to be present.

2.0 Purpose and Scope

The purpose of this procedure is to protect D&MG employees from hazards associated with UXO and CWM, and to assure that only appropriately-skilled subcontractor personnel handle UXO and CMW.

Attachment 39-1 contains definitions relative to UXO and CMW to assist a Project Manager in determining whether a project is subject to this procedure.

3.0 Implementation

Field Activities - Implementation of this standard is the responsibility of the Project Manager.

4.0 Requirements

A. Presence of UXO or CWM

- 1. Determine whether a site is known to contain or there is a reasonable probability based on client information or knowledge of prior use that a site may contain UXO or CWM.
- 2. If either of the above are affirmative, then D&MG must contract with a qualified UXO/CMW contractor to conduct all related field activities.

B. Participation by D&MG Personnel

Prohibit D&MG personnel from participating in UXO or CWM field activities unless they are under the direct supervision of a qualified UXO/CWM contractor.

C. Qualified UXO Contractor

Contract only with qualified UXO contractors

- 1. A qualified UXO Contractor is one who employs personnel who have graduated from US Navy EOD School, Indian Head, MD (U.S. operations).
- 2. Personnel who are Hazardous Devices Technicians who have graduated from the Hazardous Devices School, Redstone Arsenal, AL, are not considered qualified UXO personnel for D&MG projects (U.S. operations).
- 3. For non-U.S. operations, contract with UXO contractors who possess qualifications equivalent to those described in (a), above.

D. Operating Standards

Require UXO Contractors to adhere to operating standards equivalent to those found in U.S. Army Corps of Engineers, Huntsville Division "Safety Concepts and Basic Considerations for Unexploded Ordnance (UXO) Operations."

- E. Site-Specific Health and Safety Plan (SSHSP)
 - Development of the SSHSP for any UXO project shall be accomplished by the UXO contractor. D&MG personnel shall operate under the UXO contractor's SSHSP during all activities in which UXO may be present.
 - 2. Reviews of non-UXO sections of UXO SSHSPs are to be accomplished by a D&MG Health and Safety Program Representative.

5.0 Documentation Summary

Project Safety File

- A. Documentation of UXO Contractor qualifications.
- B. Copy of UXO Contractor's site safety and health plan.

6.0 Resources

A. USACE ER 385-1-92 "Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OEW) Activities"

(http://www.usace.army.mil/inet/usace-docs/eng-regs/er385-1-92/toc.htm)



DMG Health & Safety Program DEFINITIONS- UNEXPLODED ORDNANCE/CHEMICAL WARFARE MATERIALS

- Ordnance and Explosive Waste (OEW). OEW is anything related to munitions designed to cause damage to personnel or material through explosive force, incendiary action or toxic effects. OEW is: bombs and warheads, missiles; artillery, mortar and rocket ammunition, small arms ammunition; antipersonnel and antitank mines; demolition charges; high explosives and propellants; depleted uranium rounds; military chemical agents; and all similar and related items or components, explosive in nature or otherwise designed to cause damage to personnel or material (e.g., fuze, boosters/propellants or soils with explosive constituents are considered explosive waste if the concentration is sufficient to be reactive and present an imminent safety hazard as determined by the USACE OEW MCX).
- Unexploded Ordnance (UXO). An item of explosive ordnance which has failed to function as designed or has been abandoned, discarded or improperly disposed of and is still capable of functioning causing to personnel or material.
- Conventional Ordnance Site. An OEW site that is not suspected of containing chemical agent.
- Chemical Warfare Materiel (CWM). Abandoned, fired, burned or otherwise
 disposed of equipment, munitions, devices and containers designed for use directly
 in connection with the deployment, testing or containerization of chemical agent or
 other equipment and materiels that are above the 3X level of contamination as
 defined in AR 385-61 and DOD 6055.9 STD. This term includes former production
 facilities, buried, range recovered or found chemical munitions, chemical agent
 containers or chemical agent identification sets.
- Chemical Surety Materiel. Chemical agents and their associated weapon systems or storage and shipping containers that are either adopted or being considered for military use. Categories are described in AR 50-6.
- Chemical Agent. A chemical compound intended for use (to include experimental compounds) in military operations to kill, seriously injure or incapacitate persons through its chemical properties. Excluded are Research Development Test and Evaluation (RDTE) dilute solutions, riot control agents, chemical defoliants and herbicides, smoke, flame and incendiaries and industrial chemicals.
- Intrusive Activities (CWM sites). Intrusive activities on a CWM site means digging
 with the intent of revealing an anomaly. All intrusive activities on a CWM site require
 a safety submission.

- Chemical Agent Event. The term chemical agent event applies to:
 - Chemical agent leaks of munitions in the chemical agent stockpile.
 - Requirements for emergency transportation and/or disposal of known or suspected chemical agents.
 - Any release of chemical agent to the environment outside of closed systems, facilities or devices (for example, lab hood, glove box, munitions, bulk containers which are specifically designed to contain chemical agents) greater than the airborne exposure standards established by DA (per DOD 6055.9 standards promulgated in AR 385-64 and DA Pam 385-64) or release resulting in personnel exhibiting clinical signs or symptoms of chemical agent exposure.
 - Any exposure or release of agent which does not exceed airborne exposure standards established by DA, but nonetheless is receiving media attention.
 - Any deliberate release of chemical agent resulting from a terrorist or criminal act (including employment of an improvised chemical device intended to disperse chemical agent regardless of whether device has functioned or not).
 - Loss of chemical surety material (other than deliberate destruction by approval, authorized laboratory and demilitarization processes, including training expenditures).
 - Release of or exposure to chemical agents, whether classified as chemical agent or experimental.
- Safety Submission. A document which contains numerous plans developed by various participating agencies and is required to be submitted through the appropriate command structure. It is required for intrusive activities on both conventional and CWM sites. For conventional OEW sites, a safety submission is required in a accordance with AR 385-64 on all FUDS projects involved in the removal of OEW and OEW removal actions associated with active installation or base closure activities that will support or become a part of a property disposal action. For CWM projects, a safety submission is required whenever the intent of the work activity is to uncover anomaly(s). Further details are provided in Appendix C.
- Protective Action Plan. A plan developed to document and communicate hazards to the public arising from site activities and the specific procedures and actions to be taken to protect public safety and health during site activities and in the event of emergency conditions. The plan includes a description of site activities, any potential hazards to the public from these activities, and the means for identifying and monitoring the potential hazards; description of the protective actions to be taken to protect the public from site hazards, including a copy the Downwind Hazard

Assessment; description of any emergency response procedures which may be invoked in response to a site emergency; a list of the agencies involved in site activities and a description of their functions and responsibilities; including names, title, and phone numbers of key personnel; a copy of all Memorandum of Agreements executed between USACE and local emergency responders; and, definitions and acronyms.

- Maximum Credible Event. The worst single event that could occur at any time with
 maximal release of chemical agent from a munitions, bulk container or process as a
 result of an unintended, unplanned or accidental occurrence. The event must be
 realistic with reasonable probability of occurrence.
- Maximum Probable Event. The worst potential mishap most likely to occur during routine handling, storage, maintenance or surveillance operations, which results in the release of agent and exposure of personnel.
- **D2PC.** Computer modeling program used to determine the prediction of downwind hazard resulting from a release of toxic chemical agent.
- Downwind Hazard Assessment. An assessment of the hazards resulting from an
 accidental release of chemical agent downwind from the location of the release.
 Describes release scenarios and prescribes precautionary and emergency response
 procedures.
- Table Top Exercise. An activity in which elected or appointed officials and key staff
 with emergency management responsibilities are gathered together informally to
 discuss various simulated emergency situations. The purpose is for participants to
 evaluate plans and procedures and to resolve questions of coordination and
 assignment of responsibility throughout the exercise.
- **Pre-op Survey.** Required whenever a safety submission is required. Field personnel perform a dry run in the presence of the selected committee to ensure that all provisions of the site plan and safety submission and applicable regulations are complied with and to demonstrate operator proficiency.
- Qualified UXO Personnel. Determined by the OEW, MCX.

URS SAFETY MANAGEMENT STANDARD Fall Protection

1. Applicability

This procedure applies to URS facilities and field operations where personnel could be exposed to fall hazards of 6 feet (2 meters) or greater.

2. Purpose and Scope

The purpose of this procedure is to provide criteria for the recognition and control of fall hazards.

3. Implementation

Facilities - Implementation of this procedure is the responsibility of the Office Manager.

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Training

- 1. Designate a competent person to provide training in fall hazard recognition to each employee who may be exposed to falls. The competent person must be qualified in the following areas:
 - a. The nature of fall hazards in the work area.
 - b. The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
 - c. The use and operation of guardrail, personal fall arrest, safety net, warning line, and safety monitoring systems, controlled access zones, and other protection to be used.
 - d. The role of each employee in the safety monitoring system, when used.
 - e. The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs.

URS SAFETY MANAGEMENT STANDARD Fall Protection

- f. The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
- q. The role of employees in fall protection plans.
- h. The standards contained in 29 CFR 1926 Subpart M.
- 2. Prepare a written certification record which includes the name of the employee trained, the date(s) of training, and the signature of the person who conducted the training.
- 3. Provide retraining when one of the following situations occur:
 - a. Changes in the workplace render previous training obsolete.
 - b. Changes in the types of fall protection systems or equipment to be used render previous training obsolete.
 - c. Inadequacies in affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

B. Fall Protection - General

Ensure that one or more of the fall protection/prevention systems outlined in this procedure is provided at all locations where fall hazards of 6 feet (2 meters) or greater exist. These locations include, but are not limited to, excavations, unprotected elevations, ladders, scaffolds, floor holes, wall openings, formwork, rebar tying, and all other locations and operations where potential fall hazards exist.

C. Guardrail Systems

- Provide guardrail systems, when feasible, at all locations where a fall hazard of 6 feet (2 meters) or greater exists. Where guardrail systems are impractical, an alternative form of fall protection as outlined elsewhere in this procedure must be provided.
- 2. Require that guardrail systems meet the following criteria:
 - a. Toprails must be installed 42 inches (1.1 meters) above the walking/working surface and be capable of withstanding, without failure, a minimum force of 200 pounds (91 Kg) in



DMG Health & Safety Program

REMOTE TRAVEL HEALTH & SAFETY PREVENTION OF INSECT RELATED DISEASES

Mosquito and insect protection involves more than occasional use of repellents. A multiphase approach is essential to achieve effective protection. Following these recommendations will greatly reduce the likelihood of developing insect related diseases such as malaria, yellow fever, filariasis, leishmaniasis, japanese encephalitis, dengue fever, onchocerciasis, and trypanosomiasis.

1. Clothing

Treat all clothing, including socks, with Permethrin before leaving your home base and every 4 weeks thereafter with a Permethrin based clothing treatment. Permethrin is commercially available in a 0.5% spray (Duranon or Permanone). Permethrin is considered superior to DEET containing repellents for treating clothing. Permanone exhibits these qualities: minimal skin absorption, high level of safety, adheres tightly to fabric and will last through multiple washings, will not harm or stain fabric, will not soften or melt plastic or synthetic material, kills insects on contact thereby reducing local insect density, and is effective against mosquitoes, ticks, flies, and other insects.

2. Laundry

Laundry plans and procedures should address appropriate vector control strategies. Adequate amounts of clean water for laundry should be available in tent camp environments. Dry clothing should be available at all times. All clothing should be treated with permethrin based products every 4 weeks.

3. Skin Repellents

Insect repellents containing DEET (N, N-diethyl meta-toluamide) are the most effective for short term protection. Due to exposure related concerns, use strengths of between 35% and 50 percent. Organic repellents such as citronella have little effectiveness and are not recommended. *Skin-So-Soft* has very limited effectiveness and is not recommended. DEET is effective in relatively small amounts, provided it is spread evenly and completely over all exposed

PAGE 1 OF 2

skin. It is effective for about 3 to 4 hours and may need to be reapplied more frequently, especially if you are in humid conditions. Wearing a bandanna treated with Permanone is also effective in preventing bites around the neck area.

4. Housing Precautions

If tent camping is necessary, all tents should be treated with permethrin based products initially and every four weeks thereafter. Permanone treated mosquito netting should be used while sleeping. Camp vector control methods must be established at each location e.g. area spraying; dry, safe storage areas for clothing and food products. Provisions for flood control must be included when setting up work camps.

Adequate amounts of treated water must be available for bathing on a daily basis. DEET products must be washed off the skin daily, otherwise skin breakdown can occur, creating opportunity for infection. "Sun Showers" filled with water early in the morning and left in the sun until evening will be sufficiently hot enough to kill microorganisms, snails, etc. so that the water is safe for bathing.

Sexually Transmitted Disease Prevention

Sexual contact is the major route of spreading HIV worldwide. This means that prevention of AIDS is largely under self control. There is no documented evidence of HIV transmission through casual contacts; air, food, or water routes; contact with inanimate objects; or through mosquitoes or other arthropod vectors. The risk for HIV transmission is through sexual intercourse or blood or blood components.

The transmission of AIDS from contaminated blood and blood products is a serious problem in developing countries. Unless your need is critical, don't receive any transfusions. Delay treatment until you reach a facility where the blood supply has been screened and is considered safe. If possible, avoid receiving any injections from in-country medical services due to the high likelihood of possible contamination.

D&MG SAFETY MANAGEMENT STANDARD CRANE SUSPENDED PERSONNEL PLATFORMS (MANBASKETS)

1.0 Applicability

This procedure applies to D&MG projects involving the use of manbaskets suspended from cranes.

2.0 Purpose and Scope

The purpose of this procedure is to establish safe work practices for the use of manbaskets, and to provide design, construction, and rigging requirements for manbaskets.

3.0 Implementation

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

A. General

- 1. Use manbaskets <u>only when</u> no less hazardous means of access to elevations exist (e.g., ladders, aerial lifts, scaffolds, etc.)
- 2. Conduct and document (using Attachment 37-1) a pre-lift meeting to review the requirements and procedures to be followed. The crane operator, signal person(s), person(s) to be lifted, and the person responsible for the task must attend the meeting. A meeting must be conducted prior to the trial lift at each new work location, and repeated when any new employee is assigned to the operation.

B. Crane and Derrick Requirements

- 1. Require all cranes and derricks to be properly inspected in accordance with SMS 38, "Cranes".
- 2. Hoist the personnel platform in a slow, controlled manner with no sudden movements.
- 3. Require that load lines are capable of supporting at least seven (7) times the maximum intended load. Rotation resistant lines must be capable of supporting at least ten (10) times the maximum intended load.

- 4. Engage all load and boom hoist drum brakes, swing brakes, and locking devices such as pawls or dogs when the occupied platform is in a stationary position.
- 5. Level the crane to within one percent (1%) of level grade, and fully extend outriggers in accordance with manufacturer's specifications.
- 6. Do not exceed fifty percent (50%) of the rated capacity for the crane's radius and configuration when hoisting loaded personnel baskets and associated rigging.
- 7. Prohibit the use of cranes or derricks with live booms.
- 8. Require that cranes with variable angle booms are equipped with a boom angle indicator that is readily visible to the operator.
- 9. Use only cranes which have been equipped with anti-two-blocking devices for personnel platform hoisting.
- 10. Determine the load radius to be used during the lift prior to hoisting personnel.
- 11. Always power down when lowering the basket. The use of the load hoist brake only and/or free falling is prohibited.

C. Personnel Platform Requirements

- 1. Use only platforms which have been designed by a qualified engineer specifically for personnel use, and which meet the requirements of U.S OSHA Requirements Cranes and Derricks 29 CFR 1926.550.
- 2. Do not load a personnel platform in excess of the rated load capacity.
- 3. Allow only the employees necessary to perform the work to occupy the platform, but never exceed 4 employees in the basket.
- 4. Use personnel platforms only for employees, their tools, and the materials necessary to do the work.

- 5. Do not use platforms for hoisting materials and tools when not hoisting personnel.
- 6. Evenly distribute and secure tools and materials within the platform.

D. Rigging Requirements

- 1. Use a master link or shackle to connect each bridle leg when using a wire rope bridle to connect the personnel platform to the load line.
- 2. Require that crane hooks can be closed and locked, eliminating the throat opening or use an alloy anchor type shackle with a bolt, nut, and retaining pin for attachment of the platform to the load line.
- 3. Use thimbles when fabricating eyes in wire rope slings.
- 4. Tag all bridles and associated rigging used for attaching the platform → to the hoist line "For Personnel Use Only", and do not use for any purpose other than hoisting personnel.

E. Trial Lift, Inspection, and Proof Testing by Designated Competent Person

- Conduct a trial lift, with the unoccupied platform loaded at least to the anticipated lift weight, to each location at which the platform is to be hoisted and positioned immediately prior to placing personnel on the platform.
- 2. Repeat the trial lift whenever the crane is moved to a new location or when the lift route is changed.
- 3. Hoist and inspect the platform after the trial lift and before hoisting personnel. Correct any defects found during the inspection before hoisting personnel.
- 4. Proof test the platform at each jobsite to 125% of it's rated capacity prior to hoisting employees and after any repair or modification by holding it in a suspended position for 5 minutes with the test load evenly distributed on the platform.

E. Safe Work Practices

- 1. Require employees, except the signal person, to keep all parts of the body inside of the platform during raising, lowering, and positioning.
- 2. Use tag lines unless their use creates an unsafe condition.

- 3. Secure platforms that are not landed to the structure before allowing employees to enter or exit.
- 4. Discontinue personnel hoisting operations upon indication of adverse weather conditions or other impending danger.
- 5. Require that employees being hoisted remain in sight of the operator or signal person. When this is not possible, radio communication may be used.
- 6. Do not make any lifts on another of the crane's load lines while personnel are suspended.
- 7. Direct the operator to remain at the controls at all times while the crane engine is running and the platform is occupied.
- 8. Require that all employees occupying the platform are using a body harness with the lanyard attached to the lower load block, or to a structural member within the platform capable of withstanding a fall impact.
- 9. Do not hoist employees while the crane is traveling.

5.0 Documentation Summary

File the following documents in the Project Health and Safety file:

- A. Pre-lift meeting documentation (Attachment 37-1).
- B. Documentation as required by SMS 38, "Cranes".

6.0 Resources

- A. U.S. OSHA Standard Cranes and Derricks 29 CFR 1926.550 (http://www.osha-slc.gov/OshStd_data/1926_0550.html)
- B. ANSI B30.5-1968 (http://web.ansi.org/public/std_info.html)
- C. U.S. OSHA Publication 3100 Crane or Derrick Suspended Personnel Platforms

(http://www.osha-slc.gov/Publications/Osha3100.pdf)



PERSONNEL PLATFORM PRE-LIFT FORM

١.		Jobsite:					
2.	Job	description (includ	de estimated time	required):			
3.	Bas	sket needed:		2-man:	Other (specify):		
4.	Location and Load						
	A.	Height from grou	ınd in feet:		(approximate)		
	В.					Other	
	C. Expected load in pounds:						
		1) People at 25	iO pounds each				
		2) Weight of to	ols and material _				
		3) Subtotal wei	ght				
		4) Weight of ba	isket and rigging				
		5) Total weight					
5.	Pre	e-lift Meeting (signa	atures):				
	A. Crane Operator (Crane & manbasket inspected)						
	B. Craftsmen, including tag line person						
6.	C. Competent Person Pre-lift:						
	A. Test load in pounds(1 1/2 times item 4.C.3 subtotal weight above)						
	B. Crane operator to check boom angle and radius for capacity.						
		Crane capacity in pounds					
		4) If item "3)" is larger than item "2)", this crane may not be used.					
	C.	C. Full cycle test lift with test load (Item 6.A) completed.					
		Competent Person Signature					
7.	If the crane must be relocated, then a new Personnel Platform Pre-lift Form is required."						
8.		The crane operator will not leave the cab while a manbasket is suspended, occupied or not					
		occupied.					
	No	ote: Retain one co	opy at each jobsi	ite and send a copy	y to the Safety Manager.		
9.	Ni	ightlift approval:					
٥,		3	Site Manager		Safety Supervisor		
10.	Αţ	pproved:	<u></u>				
			Site Manager		Safety Supervisor		

D&MG SAFETY MANAGEMENT STANDARD CRANES

1.0 Applicability

This procedure applies to D&MG projects involving the use of cranes.

2.0 Purpose and Scope

The purpose of this procedure is to establish safe practices for the operation and maintenance of cranes in order to minimize the potential for personal injury and property damage.

3.0 Implementation

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

A. General

- 1. Allow only qualified, licensed operators to operate cranes.
- 2. Obtain annual inspection certification prior to use of any crane.
- 3. Designate a Competent Person to perform a Pre-Acceptance Inspection prior to accepting a crane from a vendor or owner. See Attachments 38-2, 38-3, 38-4.
- 4. Keep manufacturer's Operator's Manual in the cab of the crane.
- Comply with manufacturer's specifications and limitations for the operation of all cranes.
- 6. Never modify a crane without the manufacturer's written approval.
- 7. Repair booms in accordance with manufacturer's specifications only.
- 8. Provide an easily accessible fire extinguisher with a minimum rating of 5 B:C in the cab of each crane.
- 9. Provide safety latches for all load hooks.

- 10. Require that rated load capacities, recommended operating speeds, and special hazard warnings are posted on the crane in a place visible to the operator while at the controls.
- 11. Down-rate load ratings by 2% for each degree of temperature below zero degrees Fahrenheit (-18 degrees C) until minus 30 degrees (-34 degrees C) is attained.
- 12. Do not make lifts when the temperature is minus 30 degrees (-34 degrees C) or below.
- 13. Determine the weight of the lift to within 5% prior to making the lift. When determining the weight, consider all handling devices, i.e. rigging, load block, and load line from the tip of the boom to the load, as part of the load.
- 14. Test the crane's brakes by raising the load a few inches (5 cm) and applying the brakes each time a load approaches the crane's rated capacity.
- 15. Consider wind loads when making lifts. (See Attachment 38-1)
- 16. Always barricade the swing radius of the superstructure.
- 17. Perform and record results of air monitoring for toxic gases and oxygen deficiency when using equipment in, or equipment exhausts into, enclosed spaces.
- 18. Restrict side loading to freely suspended loads.
- 19. Use taglines at all times unless impractical.
- 20. Require that all jibs are equipped with positive stops to prevent their movement of more than 5% above the straight line of the jib and boom.
- 21. Designate a competent person to provide hand signals to the operator, and post a hand signals chart at the jobsite. The crane operator must take signals only from the designated signalman.
- 22. Never allow personnel under the load or swing a load over personnel.
- 23. Sound the horn when swinging loads.
- 24. Prohibit all personnel from riding the hook, ball, load block, or load.
- 25. Require that the house swing is locked when leaving the crane unattended, even if for only short periods of time.

- 26. Tie the main hook off to a secure anchor at the end of each shift.
- 27. Boom cranes down and rest on a suitable support when high winds are likely overnight.
- 28. Provide ground personnel to observe clearances when the operator's visibility is obscured or when traveling the crane.
- 29. Deenergize electrical power lines, as feasible, or provide insulating barriers when working proximate to power lines.
- 30. When working in proximity to energized power lines which have not been provided with insulating barriers, refer to SMS 34, "Utility Clearances".
- 31. Require that transmission towers are deenergized, or crane and load are properly grounded when working near transmitters where an electrical charge can be induced.

B. Truck Cranes

- 1. Never lift a load beyond the tipping point, which is the moment the wheels opposite the load leave their initial, unloaded position.
- 2. Require that the crane is level to within 1/8 inch (3 mm) in 24 inches (61 cm).
- 3. Fully extend all outriggers and lift carrier wheels until they just clear the ground.
- 4. Use timbers that are larger than the dimensions of the outrigger pads under the outrigger pads when ground conditions are less than ideal.
- 5. Never use the front bumper counterweight to increase lifting capacity unless it is indicated in the load capacity chart.
- 6. Do not lift a load over the front of a truck crane unless the crane's manufacturer approves such a lift.
- 7. Use nylon slings when handling tubular chord boom sections to avoid damage to the chords and lattice.
- 8. Assemble and disassemble pin-connected booms in accordance with SMS 41, "Rigging".

C. Crawler Cranes

- 1. Never lift a load beyond the tipping point, which is the moment the track rollers leave the roller path opposite the load.
- 2. Require that the crane is level to within 1/8 inch (3 mm) in 24 inches (61 cm).
- 3. Make turns on hard, level ground only.
- 4. Use special care and a suitable safety holdback device when travelling up or down steep slopes.
- 5. Require that drive chains are always to the rear of the crane when travelling or lifting.
- 6. Use blocks against the sprocket or idler when lifting a load over the front or rear of the crane.
- 7. Use timber mats when ground conditions are less than ideal. Position mats crosswise to the tracks.
- 8. Install traction bars when the work area is covered with ice or snow.
- 9. Reduce rated loads by 20% when travelling with load over side of crawler or when travelling and swinging simultaneously.
- 10. Use nylon slings when handling tubular chord boom sections to avoid damage to the chords or lattice.
- 11. Assemble and disassemble pin-connected booms in accordance with SMS 41, "Rigging".

D. Hydraulic Cranes

- 1. Never lift a load over the side unless all outriggers have been set.
- 2. Never lift a load over the front unless all outriggers have been set.
- 3. Engage the mechanical swing lock and reduce travel speed to creep speed when travelling with loads that approach the crane's capacity (on rubber rating).
- 4. Tie all loads being carried to the front of the crane.
- 5. Extend all power telescoping boom sections equally.

- 6. Always use an anti two-blocking device.
- 7. Provide back-up alarms.
- 8. Inflate tires to recommended pressure before lifting on rubber.
- 9. Do not permit "on rubber" lifting with the boom extended.

E. Critical Lift Permits

Require a completed Critical Lift Permit (Attachment 38-9) prior to all lifts which meet any of the following conditions:

- 1. Lifts over live process lines, critical equipment, high voltage power lines, or other lifts which may jeopardize personnel and/or plant operations.
- 2. Lifts of 25,000 pounds (11,360 Kg) or greater.
- -

- 3. Multi-crane lifts.
- 4. Single crane lifts exceeding 75% of the crane's rated capacity, regardless of weight.
- 5. Manbasket lifts (Refer to SMS 37, "Crane Suspended Personnel Platforms").

F. Inspections

Designate a Competent Person to inspect all cranes in accordance with the following attachments:

- 1. Crawler Crane Pre-Acceptance Inspection (Attachment 38-2).
- 2. Truck Crane Pre-acceptance Inspection (Attachment 38-3).
- 3. Hydraulic Crane Pre-Acceptance Inspection (Attachment 38-4).
- 4. Daily Equipment Checklist All Cranes (Attachment 38-5).
- 5. Monthly Crawler Crane Inspection (Attachment 38-6).
- 6. Monthly Hydraulic Crane Inspection (Attachment 38-7).
- 7. Wire Rope Inspection (Attachment 38-8).
- 8. Annual Inspection/Certification (3rd Party)

5.0 Documentation Summary

File these documents in the Project Safety and Health File:

- 1. Operator's qualifications and licenses.
- 2. Copies of all inspections required by Subsection E, "Inspections".
- 3. Air monitoring results, as applicable.
- 4. Critical Lift Permits.

6.0 Resources

- A. U.S. OSHA Standard Cranes, Derricks, Hoists, Elevators 29 CFR 1926 Subpart N (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_N.html) -
- B. U.S. OSHA Standard Motor Vehicles, Mechanized Equipment 29 CFR 1926 Subpart O (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_O.html)
- C. U.S. OSHA Standard Power Transmission and Distribution 29 CFR 1926.952, 955 (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_V.html)
- D. U.S. OSHA Technical Links Crane, Derrick and Hoist Safety (http://www.osha-slc.gov/SLTC/cranehoistsafety/index.html)
- E. U.K. Health and Safety (Lifting Operations) Regulations
- F. "Mobile Craning Today" (http://www.oetio.com/05/05fr.htm)
- G. ANSI/ASME B30.5 1982 (http://www.ansi.org/cat_top.html)
- H. Australian Standards AS1418.1 to .17. Cranes (including hoists and winches)



D&MG Health & Safety Program WIND LOADS

The wind pressure (P) in pounds per square foot on a flat surface normal to the direction of the wind for any given velocity (V) in miles per hour is given quite accurately by the formula

P = 0.004 V

The following table gives the pressure per square foot on a flat surface normal to the direction of the wind for different velocities, as calculated by the formula.

Velocity, miles <u>per hour</u>	Pressure, Ibs. per sq. ft.
10	0.4
20	1.6
30	3.6

Use the formula above to calculate the pressure per square foot times the load area. Lifting is not permitted with wind velocity above 30mph, or if the force exceeds 2% of the crane's chart capacity.



D&MG Health & Safety Program PRE-ACCEPTANCE OR RELEASE CRAWLER CRANE INSPECTION REPORT

	Make	Mode	:l		Basic Capacity	Serial Number		
	Vendor In	spection L	ocation	1	Date	Order Number		
Rem	arks:							
		180000	ONDITI	ON:	1			
		Good	Fair	Poor		NOTES		
		artites 1985		I GENEI	RAL			
1.	Appearance							
2.	Paint							
3.	Glass							
4.	Grease & oil leaks							
5.	Rating chart							
6.	Load indicator							
7.	Fire Extinguisher							
**	当于是其首并是是		, EN	GIŅE.(UPPER) = 1			
8.	Oil level & condition							
9.	Starting equipment							
10.	Cooling system							
11.	Anti-freeze							
12.	Anti-icing equipment							

		CC	DNDITI	ON	
		Good	Fair	Poor	NOTES
13.	Battery condition				
14.	Air system				
15.	Hydraulic system				
16.	Engine instruments				
			TORC	ÚESC	NVERTERS
17.	Instruments				
18.	Temperature				
19.	Pressure				
197		2.27	Ď	RAW V	VORKS!
20.	Boom hoist				4 •
21.	Clutch				
22.	Brake				
23.	Swing/friction				
24.	Swing/other				
25.	House lock				
26.	Travel				
27.	Turning dogs				
28.	Main hoist				
29.	Brake				
30.	Power down				
31.	Auxiliary hoist				
32.	Brake				
33.	Third drum				
34.	Brake .			<u></u>	
2.5 142			L.	ÖWER	WORKS
35.	House rollers				
36.	Hook rollers			1	
37.	Roller path		<u>_</u>		
38.	Track pads				
39.	Track pins				

		CONDITION		ON	
		Good	Fair	Poor	NOTES 4
40.	Tumblers				
41.	Rollers				
42.	Idlers				
43.	Sprockets				
44.	Chains		·		
45.	Track adjustment				
140 VER	BOOM:	No	3	100 marks	Length
46.	Point sheaves				
47.	Sheave guards				
48.	Load line dead end				•
49.	Chords				·
50.	Lattice				
51.	Boom connections				
52.	Boom stops				
53.	Boom cutout				
54.	Boom angle indicator				
7.7	JIB	No.	e in mount		Length, Service Control of the Contr
55.	Point sheave				
56.	Sheave guards				
57.	Connections				
58.	Chords				
59.	Lattice				
60.	Stops				
61.	Strut				
	MAST	÷,⊼Ñó.			JLength
62.	Point sheaves				
63.	Sheave guards				
64.	Connections				
65.	Chords				
66.	Lattice				

		=∵.co	DNDITI	ON	
		Good	Fair	Poor	NOTES)
67.	Stops				
68.	Pendants/guy Lines				
11			70.00	GANT	RY
69.	Sheaves				
70.	Pins				
2004 96				EQUAL	IZER
71.	Sheaves				
72.	Pins				
	MAIN,I	OAD	вцос	K	Capacity.
73.	Sheaves				
74.	Swivel				
75.	Hook/shackle				
76.	Safety latch				
15 Te		1	ĀŲ	XILIAR	YĽOAD
77.	Headache ball				
78.	Drop block				
79.	Swivel				
80.	Safety latch				
30	COUNTERWEIGHTS		1007	14. 18. 18. 18. 18. 18. 18. 18. 18. 18. 18	Specify Weight
81.	Crane counterweight				
82.	Auxiliary counterweight				
83.	Car body counterweight				
84.	Locking devices				
- ‡ (WIRE ROPE				Specify Type
85.	Main load line				
86.	Auxiliary load line				
87.	Boom hoist line				
88.	Boom pendants				
89.	Jib pendants				

	· · · · · · · · · · · · ·	ITIDNO	ON				
	Good	Fair	Poor	で <u>ままままます。</u> で <u>まずきまなま</u>	NOTES		
Does crane meet current inspe	ection an	d certi	fication	requireme	ents:		
					0.45		
Has boom and jib been N.D.T.	tested?			Certify			
Have load hooks/shackles bee	n N.D.T.	teste	Certify				
Has boom or jib been repaired	17				Specify		

SUMMARY OF INSPECTION

I acknowledge this inspection report to show,the condition of the above equipment. This report shall be used as reference to determine the repairs to be made during the rental period and at the termination of the rental period.

Inspector:	
Approval:	
Vendor's approval to inspection report:	



D&MG Health & Safety Program PRE-ACCEPTANCE OR RELEASE TRUCK CRANE INSPECTION REPORT

	Make	Mode	1		Basic Capacity	Serial Number
	Vendor	Inspection L	ocation		Date	Order Number
Rema	ırks:					
		·				
		- Elec	ONDITI	ON		
		Good	Fair	Poor		NOTES
				GENEI	The Control of the Co	randidir adaptat filoso (aperticio).
1.	Appearance					
2.	Paint					
3.	Glass					
4.	Grease & oil leaks					
5.	Rating chart					
6.	Load indicator					
7.	Fire Extinguisher					
1. 1.2		THE TANK THE	EN	GINE((UPPER)	
8.	Oil level & conditio	n				
9.	Starting equipmen	t				
10.	Cooling system					
11.	Anti-freeze					
12.	Anti-icing equipme	ent				

CONDITION NOTES Fair 13. Battery condition Air system 14. 15. Hydraulic system Engine instruments atiorque converger Instruments 17. 18. Temperature 19. Pressure DRAWWORKS Boom hoist 20. 21. Clutch 22. Brake 23. Swing/friction 24. Swing/other 25. House lock Main hoist 26. 27. Brake 28. Power down 29. Auxiliary 30. Brake 31. Third drum 32. Brake CARRIER Outrigger beams 33. Outrigger cylinders 34. 35. Outrigger floats 36. Tires 37. Lights Brakes 38. 39. Steering 40. Sprockets

CONDITION NOTES Good Fair Chains 41. 42. Track adjustment ENGINE (LOWER) Starting equipment 43. Cooling system 44. 45. Air system 46. Instruments #ABOOM ANO Service a Length As Assessment Asset Assessment Assessm 47. Point sheaves 48. Sheave guards 49. Load line dead end 50. Chords 51. Lattice 52. Boom connections Boom stops 53. Boom cutout 54. Boom angle indicator 55. Length No. 1 Point Sheave 56. Sheave guards 57. Connections 58. 59. Chords 60. Lattice 61. Stops 62. Strut MASTI So No. 63. Point sheaves Sheave guards 64. 65. Connections 66. Chords 67. Lattice

		C	ITIDNC	ON	
		Good	Fair	Poor	NOTES
68.	Stops				
69.	Pendants/guy lines				
POST TO THE POST T				GANT	RY
70.	Sheaves			1	
71.	Pins				
				EQUAL	IZER
72.	Sheaves				
73.	Pins				
1935	MAIN	LOAD	BLOG	k _i	Capacity:
74.	Sheaves	1.			
75.	Swivel				4 •
76.	Hook/shackle				
77.	Safety latch				
Land S			ÂŪ	XILIAR	YEOAD
78.	Headache ball				
79.	Drop block				
80.	Swivel				
81.	Safety latch				
1	COUNTERWEIGHTS		and the same of	W.	Specify Weight
82.	Crane counterweight				
83.	Auxiliary counterweight				
84.	Car body counterweight				
85.	Locking devices				
3.3	WIRE ROPE		10		Specify Type
86.	Main load line				
87.	Auxiliary load line				
88.	Boom hoist line				
89.	Boom pendants				
90.	Jib pendants				

	CC	DNDITI	ON.	
	Good	Fair	Poor	NOTES
Does crane meet current insp	ection and	d certif	fication	requirements:
Has boom and jib been N.D.T	tested?	Certify		
Have load hooks/shackles be	en N.D.T.	tested	4?	Certify

SUMMARY OF INSPECTION

I acknowledge this inspection report to show the condition of the above equipment. This report shall be used as reference to determine the repairs to be made during the rental period and at the termination of the rental period.

Inspector:	•
Approval:	-
Vendor's approval to inspection report:	



D&MG Health & Safety Program PRE-ACCEPTANCE OR RELEASE HYDRAULIC CRANE INSPECTION REPORT

	Make		Model			Basic Capacity	Ser	Serial Number		
	Vendor	Insped	ction Lo	cation		Date	Ord	ier Number		
Rema	ırks:									
								<u> </u>		
										
			- co	ודומאכ	ON	1				
			Good	Fair	Poor		"NOTES"	and the second s		
	46				GENE	RAL TO L				
1.	Appearance									
2.	Paint									
3.	Glass									
4.	Glass wipers	<u>-</u>								
5.	Grease & oil leaks									
6.	Rating chart									
7.	Load indicator			1						
8.	Fire Extinguisher									
			京帝	4	ENG	NE .	NAME OF			
9.	Oil level & conditio									
10.	Starting equipment	t								
11.	Cooling system									
12	Anti franza]		1					

		C0	TIDNC	ION	
		Good	Fair	Poor	NOTES
13.	Anti-icing equipment				
14.	Battery condition				
15.	Air system	1			
16.	Hydraulic system				
17.	Engine instruments				
18.	Electrical system				
****				CARF	IER
19.	Steering assemblies				
20.	Brakes				
21.	Outriggers				
22.	Outrigger pads				
23.	Tires				
24.	Lights				
				UPF	ER
25.	Main swing assembly				
26.	Swing lock				
27.	Main hoist				
28.	Main hoist brake				
29.	Auxiliary hoist				
30.	Auxiliary hoist brake				
31.	Boom hoist			<u> </u>	
	BOOM	No.	5. e		Length
32.	Boom sections		A. C. B. E. V.	1. 5.4 5.00.	Control of the contro
33.	Point sheaves				
34.	Anti two block device				
35.	Boom angle indicator				
	Jan JiB	∗No.			Length
36.	Point sheave				
37.	Stow lock				
38.	Connections				

		C	DNDITI	ON	
		Good	Fair	Poor	NOTES
			MAII	V LOAI	BLOCK
39.	Sheaves				
40.	Swivel				
41.	Hook/shackle				
42.	Safety latch				
100	AUX	ILIARY	ĽQĂĎ		Capacity
43.	Ball				
44.	Swivel				
45.	Hook/swivel				
46.	Safety latch				4 +
	WIRE	OPE	Spe	cifyty	pe:
47.	Main load line				
48.	Auxiliary load line				
	s crane meet current insp	· <u> </u>		tification	
	boom and jib been N.D.T				Certify
}	e load hooks/shackles be		. teste	ed? ———	Certify
Has	boom or jib been repaired	d? ————			Specify
l ack		report to			ndition of the above equipment. This report shall be ade during the rental period and at the termination
Insp	ector:				
App	roval:				
Ven	dor's approval to inspecti	on repor	t:		



D&MG Health & Safety Program EQUIPMENT CHECK LIST (DAILY)

MAKE UNIT NUMBER WEEK ENDING

					STATE OF THE STATE	Bearing of the contract to
CHECKITEM 图	MONDAY	TUESDAY	WEDNESDAY,	新THURSDAY體	FRIDAY	夏SATURDAY
Engine oil						
Lubrication					•	
Starting system						
Instruments						
Cooling system						
Air system						
Hydraulic system	_					
Operating controls						
Glass, mirrors						
Defroster, operating controls			•			
Brakes						l
Steering system						
Tires						<u></u>
Safety devices						<u> </u>
Lights and reflectors						
Hom				<u> </u>		
Windshield wipers				<u></u>	<u> </u>	
Fire extinguisher	<u> </u>				<u> </u>	
These items are to be of to Maintenance Shop a	checked each mo tithe time of inspe	ming before ope ection. Turn in ch	erating this piece eck sheet to Equ	of equipment. Re ipment Supervis	eport ALL items i or at beginning o	n need of repair f the week.
Operator			Badge Num	iber		
DATE REPORTED TO THE	297 21 2222	CEP STEER	AIRS	A STEETHELLS	re la la la la la la la la la la la la la	ATE REPAIRED
			······································			



D&MG Health & Safety Program MONTHLY CRAWLER CRANE INSPECTION

Make	Model			Unit Number	Date
	<u> </u>				—
	i co	ITIDNO	ON -]	
	Good	Fair	Poor	 	NOTES

		C	ONDITI	ON :	
		Good	Fair	Poor	NOTES
		200	¥ GE	ENERA	
1.	Appearance				
2.	Paint				
3.	Glass				
4.	Grease & oil leaks				
5.	Rating chart				
6.	Load indicator				
7.	Fire Extinguisher				
		10000000000000000000000000000000000000	EN	ÍĞINE(S)
8.	Starting system				
9.	Air system				
10.	Instruments				
		Z) TO	วัสด์บูเ	ĘĠŎŊ	VERTER
11.	Instruments				
			DRA	w wo	RKS
12.	Boom hoist				
13.	Clutch				
14.	Brake				
15.	Swing/friction				
16.	Swing/other				
					···

MONTHLY CRAWLER CRANE INSPECTION (Continued)

		C.	DNDITI	ON:	
		Good	Falr	Poor	NOTES
17.	House lock				2.00
18.	Travel				
19.	Turning dogs				
20.	Main hoist				
21.	Brake				
22.	Power down				-
23.	Auxiliary hoist				
24.	Brake				
25.	Third drum				
26.	Brake				4 +
			LOW	ER WC	PRKS 4
27.	House rollers				
28.	Hook rollers				
29.	Roller path				
30.	Track pads		<u> </u>		
31.	Track pins				
32.	Tumblers				
33.	Rollers				
34.	Idlers				·
35.	Sprockets				
36.	Chains				
37.	Track adjustment		1		
	Variable Control of the Control of t	rtigicos etc	A PARTIE	BOOM	the second secon
38.	Point sheaves				
39.	Sheave guards		ļ		
40.	Load line dead end		<u> </u>		
41.	Chords				
42.	Lattice				

MONTHLY CRAWLER CRANE INSPECTION (Continued)

		· , cc	ITIDNO	ON.			
		Good	Fair	Poor	NOTES		
43.	Boom connections						
44.	Boom stops						
45.	Boom cutout						
46.	Boom angle indicator						
				JIB			
47.	Point Sheave						
48.	Sheave guards						
49.	Connections						
50.	Chords						
51.	Lattice						
52.	Stops						
53.	Strut						
		1700	Ser les	MAST			
54.	Point sheaves						
55.	Sheave guards						
56.	Connections						
57.	Chords						
58.	Lattice						
59.	Stops						
60.	Pendants/guy lines						
			,,, C	SANTRY	Temperature and the second sec		
61.	Sheaves						
62.	Pins						
			EC	QÜALIZE	R		
63.	Sheaves						
64.	Pins						
- नामा सम्भाव स्थापना सम्भाव			MAIN	LOADIB	LOCK		
65.	Sheaves						

MONTHLY CRAWLER CRANE INSPECTION (Continued)

		C	CONDITION		
		Good	Fair	Poor	NOTES
66.	Swivel				
67.	Hook/shackle	•			
68.	Safety latch				
****			AUXIL	IARY/I	OAD
69.	Headache ball				
70.	Drop block				-
71.	Swivel				
72.	Safety latch				
	WIRE ROPE	Wire F	<u>Rope</u> ; li	nspect	ion Report Attached

Inspected by:	
Title:	****



D&MG Health & Safety Program MONTHLY HYDRAULIC CRANE INSPECTION

Make	Model	Unit Number	Date
	!		
	<u></u>	<u></u>	

		C	DNDIT	ON.	·
		Good	Fair	Poor	NOTES
	STATE OF THE STATE	ANTHAL STARTS	200	GENE	RAL
1.	Appearance				•
2.	Paint				
3.	Glass				
4.	Grease & oil leaks				
5.	Fire extinguisher				
				ENGIN	E(S)
6.	Starting equipment				
7.	Air system				
8.	Instruments				
200	The second secon		17.63	CARE	NER
9.	Steering system				
10.	Brakes				
11.	Outriggers	1			
12.	Tires				
13.	Lights				
14.	Backup alarm				
			1-134	gupp	ĒR
15.	Swing assembly				
16.	Swing lock				

MONTHLY HYDRAULIC CRANE INSPECTION (Continued)

		Į∄ k C¢	ITIDNC	ON	
		Good	Fair	Poor	NOTES
17.	Main hoist				Takes to a select the
18.	Main hoist brake				
19.	Auxiliary hoist				
20.	Auxiliary hoist brake				
21.	Boom Cylinder(s)				
+ 114 ex			44.44	ВО С	M
22.	Boom sections				
23.	Point sheaves				
24.	Anti two block device				
25.	Boom angle indicator				• •
71.3172 13427				JIE	The second of th
26.	Point Sheave				
27.	Stow lock				
			MAI	Ņ,LOA	DIBLOCK.
28.	Sheaves				
29.	Swivel				
30.	Hook/shackle				
31.	Safety latch				
P 244	No.		ÄL	IXILIAF	YLOAD
32.	Ball				
33.	Swivel				
34.	Hook/swivel				
35.	Safety latch				
Section Section	的性体等。 大型等位置的可能的			/*** n	neilnspection Report Attached



D&MG Health & Safety Program WIRE ROPE INSPECTION REPORT

PROJECT	JOB NUMBER	MACHINE
A DATE AND ADED	CMMED	OPERATOR
UNIT NUMBER	OWNER	OPERATOR

	West very an	Kr. 1947	EMCOLETXE		ZaCOL 2契約	% COL€3	A COL名图	\$100.00
SERVICE	GONSTRUCTION I	NSP.	ORIGINAL 1	CURRENT DIA	LOSS OF DIA	BROKEN WIRESING	BREAKSING 1 STRAND) OF ONE LAY	NOTES
Main hoist								
Aux. hoist								
Boom hoist								
Boom pendants								
Jib pendants								
7000 94 2 3		**************************************	THE COMPANY		CONTRACTOR	THE TAX THE		理論的課
Main hoist								
Aux. hoist								
Boom hoist								
Boom pendants								
Jib pendants								
"生物产品"公共	Control Charles	动性出		京公司 的			PHANCE OF	
Main hoist								
Aux. hoist								
Boom hoist								
Boom pendants								
Jib pendants								Ì

NOTE: ANSI STANDARDS - ROPE MUST BE REMOVED FROM SERVICE WHEN DIAMETER LOSS OR WIRE BREAKAGE OCCURS AS FOLLOWS:

DIAMETER LOSS - COL. 1 & 2

ALL EQUIPMENT EXCEPT FOR TOWER CRANES						
ORIGINAL DIAMETER LOSS (INCH)						
3/4 (UP TO AND INCLUDING)	3/64					
7/8 - 1 1/8	1/16					
1 1/4 - 1 1/2	3/32					

NUMBER OF WIRE BREAKS - COL 3 & 4

EQUIPMENT	COL. 3 IN ONE ROPE LAY	CCL. 4 IN ONE STRAND IN ONE ROPE LAY
RUNNING ROPES		
CRANES AND	6	3
DERRICKS		
STANDING ROPES		
CRANES AND	1	1
DERRICKS		
ALSO REMOVE	ROPE IF ONE OR MOR	RE BREAKS IN THE
1	VALLEY ARE EVIDENT	Ī.



D&MG Health & Safety Program CRITICAL LIFT PERMIT

roject Name: Project Number:						
Lift Location:	Time:		_ Date;			
Description of Load:				·		
		INFORMAT		·		
Manufacturer:		Mode	el Num	ber:		
Boom/Jib Length: Main Boom:	ft. Jib:		ft.	Total Boom:	ft.	
Maximum Radius During Lift: Pick:		Swing:		Set:	•	
Direction and Degree of Swing: Fro	m:	To:		Degrees:		
Lift Elevation (0= Crane Support Ele	vation): Max	kimum		ft. Minimum:	ft.	
Boom Angles (In Degrees): Pick:		Swing:		Set:		
Jib Stowed? Yes No		Jib Ered	ted? `	Yes No		
Manufacturer's Rated Capacity (per	above config	guration and	l radii):		lbs.	
	LOAD	NFORMAT	ION			
Weight of the Load:	_lbs. Effect	ive Weight o	of Jib:_		lbs.	
Effective Weight of Overhaul Ball (2	X Ball Weigh	nt):			lbs.	
Weight of Load Block:	lbs.	We	ight of	Spreader	lbs.	
Weight of Slings:	lbs.	We	ight of	Shackles:	lbs.	
Weight of Other Rigging:	lbs.	ТО	TAL LI	FT WEIGHT:	lbs.	
LOAD PERCENT OF CRANE CAP.	ACITY PER I	_OAD CHA	₹T:		%	
Person Making Calculations Title		-/	√pprov	ed By Title		

D&MG SAFETY MANAGEMENT STANDARD

RIGGING

1.0 Applicability

This procedure applies to D&MG projects involving the use of rigging. For purposes of this procedure, the term "rigging" applies to all hoisting, reeving, guying, plumbing, and other activities involving the use of wire rope, slings, chokers, bridles, and associated fittings and equipment.

2.0 Purpose and Scope

The purpose of this procedure is to require the safe use and proper maintenance of rigging equipment.

3.0 Implementation

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4.0 Requirements

A. General

- 1. Allow only qualified, knowledgeable employees to perform rigging tasks.
- 2. Refer to U.S. OSHA Standard Rigging or a reputable rigging manual for rated capacities and other detailed information.
- Know the safe working capacity of all rigging and equipment. Do not exceed this limit.
- 4. Know the load weight, including the weight of the rigging.
- 5. Inspect all rigging before each use and remove any defective equipment from service.
- 6. Use extreme caution to avoid shock loading, especially when temperatures are below freezing. See Attachment 41-1.
- 7. Always maintain safe working distances from energized power lines and equipment as defined in SMS 34, "Utility Clearances".
- 8. Keep the load line plumb to maintain a stable load.

- 9. Never use a kinked or otherwise damaged sling.
- 10. Mark or tag each sling and choker with its rated capacity.
- 11. Do not sharply bend a sling use softeners to prevent damage.
- 12. Use a shackle with the shackle pin resting on the hook whenever placing two or more eyes over a hook.
- 13. Use tag lines on all loads whenever feasible.
- 14. Use chocks, blocks, or other means to prevent movement of materials when unhooking a load.
- 15. Stay clear of slings when they are being pulled out from under a load.
- 16. Do not give signals to the crane operator unless it is an emergency stop or you are the designated signalman.
- 17. Always use a double sling when rigging loads like pipe, rebar, or lumber over 12 feet (3.6 metres) long.
- 18. Keep your hands off suspended loads whenever possible.
- 19. Stay out from under suspended loads.
- 20. Never ride the load or headache ball.
- B. Chain and Wire Rope Slings
 - 1. Use only manufactured certified chain and wire rope slings with the rated capacity stamped on the swag.
 - 2. Protect slings from cutting action when making lifts by using padding, blocks, or corner protectors.
 - 3. Do not point load standard sling hooks.
 - 4. Choose a sling one size larger when conditions will subject the sling to severe wear, abrasion, impact, or corrosive action.
 - 5. Never subject hooks or attachments to a bending action.
 - 6. Lower loads onto blocking or cribbing to avoid damage to the sling.

- 7. Always face the hook opening out and away from the pull of the sling when making choker hitches. Don't assume that the hook is going to stay in place when the slack is being taken out of the sling.
- 8. Store slings off the ground, preferably on a choker rack, when they are not in use.
- 9. Keep slings lubricated to prevent rusting.
- 10. Require that slings have a minimum safety factor of 5. See Attachment 41-2.
- 11. Do not form sling angles greater than 60 degrees.
- 12. Never use clips to form eyes in wire rope slings or bridles.
- 13. Remove wire rope from service when:
 - a) There are 6 or more randomly distributed broken wires in any one lay, or when there are 3 or more broken wires in any one strand of any one lay.
 - b) 1/3 of an individual outside wire's diameter is worn.
 - c) There is kinking, crushing, birdcaging, or any other damage or distortion of the wire rope structure.
 - d) There is evidence of heat damage.
 - e) The rope's diameter is reduced by more than 3/64" in a rope with a diameter up to and including 3/4 "; 1/16" in a rope with a diameter from 7/8" to 1-1/8"; 3/32" in a rope with a diameter from 1-1/4" to 1-1/2".
 - f) There are two or more broken wires in any one lay in those sections beyond the end connections, or when there are one or more broken wires at the end connection.

C. Synthetic Web Slings

- 1. Require that all web slings are marked to show the name of the manufacturer, the rated capacity of the sling, and the type of material of which it is made.
- 2. Inspect the surface and stitching of the sling for cuts, abrasions, and heat or chemical damage before each use.
- 3. Do not use nylon slings in the presence of fumes, vapors, sprays, mists, or liquids of acids or phenolics.

- 4. Do not use polyester or polypropylene slings, or slings with aluminum fittings, in the presence of fumes, vapors, sprays, mists, or liquids of caustics.
- 5. Do not use polyester or nylon slings at temperatures above 180 degrees F (82 degrees C).
- 6. Do not use polypropylene slings at temperatures above 200 degrees F (93 degrees C).
- 7. Remove synthetic web slings from service if any of the following conditions are present:
 - a) Acid or caustic burns.
 - b) Melting or charring of any part of the sling surface.
 - c) Snags, punctures, tears, or cuts.
 - d) Broken or worn stitches.
 - e) Warning threads are visible.
 - f) Distortion of fittings.

D. Fittings, Hooks, and Shackles

- 1. Require that fittings, hooks and shackles have a minimum safety factor of 5.
- 2. Inspect fittings for cracks, nicks, bending, and excessive wear prior to each use.
- 3. Do not use a hook that appears to have been spread from point loading or overloading. Remove from service those hooks that have been spread more than 15 percent of the normal throat opening or twisted more than 10 degrees from the plane of the unbent hook.
- 4. Never point load a standard hook.
- 5. Do not weld anything to a hook, or use a hook that has been welded or burned in any way.
- 6. Use safety shackles whenever possible.
- 7. Never use any screw pin shackle where the bolt is very difficult to turn. The pin is either bent due to overload or the threads have been damaged.
- 8. Use the largest bearing surface possible on the shackle pin to reduce bending movement.

- 9. Use only forged alloy steel shackles with the safe working load stamped on the bale.
- 10. Use a shackle one size bigger than the sling being used with it.
- 11. Use only hot dip galvanized turnbuckles.
- 12. Prevent turnbuckles from unwinding by using locknuts or other locking devices when turnbuckles are used with one part of wire rope.

E. Wire Rope Clips

- 1. Do not use cable clips to form eyes for hoisting purposes.
- 2. Use cable clips and thimbles to form eye splices when splicing is necessary.
- 3. Use only drop forged steel cable clips.
- 4. Install cable clips with the U-bolt on the short or "dead" end and the saddle on the "live" or running end of the rope, and require that clips are properly spaced. See Attachment 41-3.
- 5. Retighten clips after newly installed rope has been in use for one hour.

5.0 Documentation Summary

File the following documents in the Project Health and Safety File:

- 1. Manufacturer's Sling Certifications.
- 2. Riggers' Training Certificates.

6.0 Resources

- A. U.S. OSHA Standard Rigging Equipment for Material Handling 29 CFR 1926.251
 - (http://www.osha-slc.gov/OshStd_data/1926_0251.html)
- B. ANSI B30.9 1971
 - (http://web.ansi.org/public/std_info.html)
- C. Bob's Rigging & Crane Handbook (see attached)
- D. Rigger's Handbook
 - (http://www.craneinstitute.com/products.htm#Books)
- E. "Mobile Craning Today" (http://www.oetio.com/05/05fr.htm)

SMS 41 Issue Date 5/7/99 Revision 0

F. Queensland Workplace Health and Safety - Rigger's Workplace Health and Safety Plan - Commercial (http://www.detir.qld.gov.au/hs/workplan/commcal.com07.pdf)



EXAMPLE OF SHOCK

TAKING UP SLACK AT FULL SPEED							
STRESS ON THE ROPE							
TOTAL LOAD AT REST "A" 6,375 LBS.							
TAKING UP 3" SLACK	"B" 11,200 LBS.						
TAKING UP 8" SLACK	"C" 12,250 LBS.						
TAKING UP 12" SLACK	"D" 15,675 LBS.						
IF SAFETY FACTOR OF 5 WAS PROVIDED FOR CONDITION "A" WHAT FACTOR DO YOU HAVE LEFT WHEN							
CONDITION HAS CHANGED TO "D"?"							
ANSWER: 6.375 x 5 = 31,875 lbs. B.S. 31,875/15 675 = 2.03 Factor of Safety	NOTE: This example does not apply in figuring the effect of shock when a load falls. The rate of fall and length of travel vary and the effect can be disastrous. The message here is to eliminate the causes of shock loading.						



SAFETY FACTORS

CABLE	APPROX. BREAKING		FACT	OR OF SAFE	ETY & ALLOV	VABLE LOAI			WEIGHT LBS/FT
SIZE	STRENGTH	7	6	5	4.5	4	3.5	3	1
1/2"	-21,200	3,300	3,600	4,300	4,700	5,3 50	6,050 1	7,150	.46
	+26.700	3,700	4,450	5,530	5,900	6,700	7,600	8,900	
5/8"	-33,20	4,800	5,550	6,700	7,300	8,350	9,400	11,150	.72
	+41,200	5,900	6,900	8,300	9,100	10,400	11,700	13,900	
3/4"	-47,300	6,700	7,750	9,400	10,500	11,750	13,500	15,700	1.04
	+58,900	8,450	9,850	11,800	13,000	14,800	16,800	1 9,7 0 0	
7/8"	-64,300	9,150	10,650	12,800	14,200	16,000	18,300	21,200	1.42
	+79,600	11,300	13,150	15,800	17,600	19,700	22,700	25,650	
1"	-83,300	11,900	13,950	16,700	18,500	20,900	23,800	27,900	1.85
	+103,300	14,700	17,150	20,300	22,900	25,400	29,500	34,200	
1-1/8"	-105,100	15,000	17,500	21,000	23,300	28,100	30,000	35,000	2.34
	+130,000	18,600	21,300	26,000	28,800	32,300	37,100	43,200	
1-1/4"	-129,100	18,400	21,250	25,900	28,600	32,200	36,800	43,000	2.80
	+168.900	24,100	28,100	33,900	37,500	42,200	48,200	56,200	
1-3/8"	-155.200	22,100	25,900	31,000	34,400	38,900	44,300	51,600	3.50
	+192,000	27,200	32,000	38,200	42,600	48,000	54,800	64,000	
1-1/2"	-184,000	26,200	30,700	36,900	40,800	46,100	52,500	61,200	4.16
	+228,000	32,500	38,00	45,500	50,600	57,000	65,100	76,000	

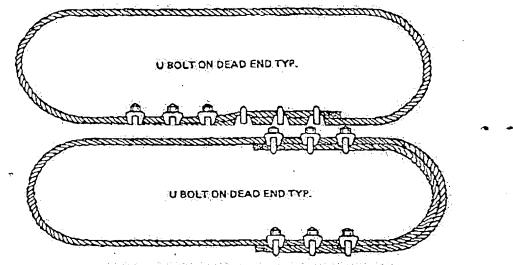
-6 x 19 l.W.R.C. improved plow steel hoisting cable (upper line) 1/2" through 1" diameter. +6 x 19 l.W.R.C. extra improved plow steel hoisting cable (lower line) 1/2" through 1" diameter. -6 x 37 l.W.R.C. improved plow steel hoisting cable (upper line) 1-1/8" through 1-1/2" diameter. +6 x 37 l.W.R.C. extra improved plow steel hoisting cable (lower line) 1-1/8" through 1-1/2" diameter.

The above chart is primarily intended to determine safe loads for hoist load lines and guy lines. If used for slings, the values must be reduced by the loss for the type of end fitting



WIRE ROPE CLIP CONNECTIONS

Because the saddle is shaped to form a seat and prevent the cutting of the outer rope strands when the load is applied, it should always be placed on the load end or longer portion of the rope. The U bolt should be in contact with the shorter portion of the loop in the rope. The distance between clips should not be less than six times the diameter of the rope.

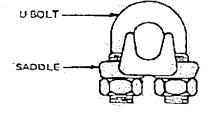


SAME NO. OF CLIPS RECOMMENDED IN CHART EACH END



NO. OF CLIPS PER CHART FOR CABLE SIZE

ROPE DIA.	MIN. NO.	SPACING	WRENCH
_	CLIPS	C/C	SIZE
3/8"	2	2-1/4"	8'
1/2"	3	3"	12"
5/8"	3	3-3/4"	12"
3/4"	4	4-1/2"	16"
7/8"	4	5-1/4"	16"
1"	5	6"	16"
1-1/8"	6	6-3/4"	16"
1-1/4*	6	7-1/2"	16*
1-3/8*	7	8-1/4*	18*
1-1/2"	7	9"	18"
1-5/8"	7	9-3/4"	18"
1-3/4"	8	10-1/2"	18*
2"	8	12"	20*
2-1/4"	8	13-12"	24"



"Bob's Rigging and Crane Handbook" is the industry standard. Get a copy from: Bob DeBenedictis, Inc. 6410 S. Atlantic Ave., New Smyrna Beach, FL 32169

904-423-7759 904-423-7573 (fax)

1. Applicability

This program defines responsibilities and procedures and is applicable to URS operations that may require the use of respiratory protection including Immediately Dangerous to Life and Health (IDLH) and emergency conditions. This program also addresses the voluntary use of respirators.

2. Purpose and Scope

The purpose of this procedure is to protect those employees performing operations for which exposures can not be controlled by use of conventional engineering or administrative controls and prior to establishing a negative air exposure assessment, and to require that respiratory protective equipment is selected, used, maintained, and stored in accordance with acceptable practices.

3. Implementation

Laboratory/Office/Shop Locations - Implementation of this program is the

responsibility of the Office Manager.

Field Activities - Implementation of this program is the

responsibility of the Project Manager.

Program Administration- URS Health and Safety Director is

responsible for the development and annual

review of this program.

URS Health and Safety Program Representatives are responsible to:

- Assist responsible employees in the implementation of the program.
- Assessing local compliance with the program.

4. Requirements

- A. Determine if respirators are needed or going to be used for hazardous jobs before assigning that job to an employee.
 - 1. If the determination is that a potential for respiratory hazards exists with any portion of that job activity then, complete Attachment 42-1.
 - 2. Contact a URS Health and Safety Program Representative if any of the questions in Attachment 42-1 are checked "yes."

- 3. Follow instructions in <u>Attachment 42-2</u> for employees who wish to voluntarily use dust masks.
- 4. Follow all the requirements of this procedure for employees who wish to voluntarily use tight-fitting (e.g., air purifying) respirators.
- 5. Required respirators will be paid for by URS and will be provided without cost to the employee.
- B. Select the proper respirator for the job.
 - 1. For those jobs identified in <u>Attachment 42-1</u>, contact a URS Health and Safety Program Representative for assistance in respirator selection.
 - 2. Contact a URS Health and Safety Program Representative for follow up if there are any problems implementing the recommendations made.
- C. Require employees who will use respirators to be medically qualified before fit testing and assigning them a respirator.
 - 1. For program details, refer to <u>SMS 24, Medical Screening and</u> Surveillance.
 - 2. Require that employees have a current and accurate Medical Surveillance form (Attachment 24-2)
 - 3. Obtain a copy of the employee's Health Status Medical Report from the Health and Safety Representative. The consulting occupational physician of the medical service provider following each work related examination issues the Health Status Medical Report. Employees cannot be assigned respirators unless they are medically cleared for respirator use.
- D. Require respirator users to receive appropriate training.
 - 1. All respirator users must be trained:
 - a. Before they are assigned a respirator.
 - b. Annually thereafter,
 - c. Whenever a new hazard or job is introduced.

- d. Whenever employees fail to demonstrate proper use or knowledge.
- 2. Training must address, at a minimum, the following:
 - a. Why the respirator is necessary, and what conditions can make the respirator ineffective.
 - b. What the limitations and capabilities of the respirators are.
 - c. How to use respirators effectively in emergency situations.
 - d. How to inspect, put on and remove, and check the seals of the respirator.
 - e. What the respirator maintenance and storage procedures are.
 - f. How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.
- E. Require respirator users to be fit tested.
 - 1. Any employee who has been assigned a reusable respirator must be fit tested on an annual basis (no more than one year may elapse between fit tests), or when the employee is assigned a respirator of a different make, type or size from that previously tested.
 - 2. Fit testing can be performed by contract or in house personnel.
 - 3. Obtain a signed written copy of the fit test results. The fit test results should include:
 - a. Employee's name and social security number.
 - b. Respirator brand, model and size fitted for.
 - c. Date fit tested.
 - d. Method of fit testing used.
 - e. Name and signature of fit tester.
 - f. Statement that fit test protocol met the requirements of 29 CFR 1910.134.

g. Manufacturer and serial number of fit testing apparatus.

A fit test results form is available at Attachment 42-5.

- F. Provide qualified employees with respirator(s) and adequate amounts of parts and cartridges.
 - 1. Assign employees whose duties require respirators their own respirator for which they have been fit tested.
 - 2. Provide special eyeglass inserts designed for the respirator if an employee must wear eyeglasses with a full facepiece respirator. Contact lenses may be worn when wearing a full facepiece respirator.
- G. Require respirators to be used properly.
 - 1. Prohibit facial hair where the respirator-sealing surface meets the wearer's face.
 - 2. Require employees to perform a positive and negative fit check every time the respirator is put on.
 - 3. Employees will leave the area where respirators are being used:
 - a. Before removing the facepiece for any reason.
 - b. To change cartridges.
 - c. If any of the following is detected:
 - 1. Vapor or gas breakthrough.
 - 2. Leakage around the facepiece.
 - 3. Changes in breathing resistance.
 - 4. Use cartridges with End of Service Life Indicators or determine the respirator cartridge changeout schedule. See <u>Attachment 42-4</u> for Guidance.
- H. Require respirators to be cleaned and stored properly.
 - 1. Clean and disinfect respirators after each use.

- 2. Store respirators in a plastic bag or case and in a clean location.
- 3. Inspect respirators before use and after each cleaning.
- I. Address issues associated with special use respirators self-contained breathing apparatus; air supply respirators; emergency use respirators).
 - 1. Self Contained Breathing Apparatus

Inspect self-contained breathing apparatus and other emergency use respirators monthly and after each use in accordance with manufacturer's instructions.

- 2. Air Supplied Respirators
 - a. Air used for atmosphere-supplying respirators must meet or exceed the requirements for Type 1 - Grade D breathing air. Never use oxygen.
 - 1. A certificate of analysis must accompany bottled air.
 - 2. Compressors used to supply breathing air must:
 - i. Prevent entry of contaminated air into the air supply.
 - ii. Minimize moisture content.
 - iii. Have suitable in-line sorbent beds and filter to provide appropriate air quality.
 - iv. Have a high carbon monoxide alarm that sounds at 10 ppm.
 - b. Couplings on air hose lines must be incompatible with other gas systems.
- J. Require follow up training and medical surveillance to be provided as directed.
 - 1. Provide follow-up physical examinations as directed by the <u>SMS</u> 24-3, <u>Medical Screening and Surveillance Exam Protocol table</u>.
 - 2. Provide follow-up physicals as directed by the Regional Medical Surveillance Administrator

- 3. Provide annual refresher training.
- 4. Provide annual fit testing.

5. Documentation Summary

- A. Laboratory
 - 1. File these records in the Laboratory Safety Filing System
 - a. Completed forms:
 - 1. "Identifying When A Respirator Is Needed" Attachment 42-1; and,
 - 2. "Respirator Standard Operating Procedure" Attachment 42-3.;
 - b. Employee Health Status Medical Report includes clearance for respirator use.
 - c. Employee Fit Test Records; and,
 - d. Employee Respirator Training Records.
 - 2. Send a copy of the following records to the Regional Health and Safety Manager:
 - a. Completed "Voluntary Use of Respirators" form <u>Attachment</u> 42-2.
 - b. Employee Fit Test Records.
 - c. Employee Respirator Training Records.
- B Field
 - 1. File these records in the Project Health and Safety File:
 - a. Completed forms:
 - 1. "Identifying When A Respirator Is Needed" Attachment 42-1; and,

- 2. "Respirator Standard Operating Procedure" Attachment 42-3.
- 3. Employee Health Status Medical Report includes clearance for respirator use.;
- 4. Employee Fit Test Records; and,
- 5. Employee Respirator Training Records.
- 2. Send a copy of the following records to the Regional Health and Safety Manager:
 - a. Completed "Voluntary Use of Respirators" form Attachment 42-2:.
 - b. Employee Fit Test Records; and,
 - c. Employee Respirator Training Records.

6. Resources

- A. U.S. OSHA Standard Respiratory Protection 29 CFR 1910.134
- B. U.S OSHA Technical Links Respiratory Protection
- C. <u>ANSI</u> Z88.6, Respirator Use Physical Qualifications for Personnel, Current Revision
- D. ANSI Z88.2, Respiratory Protection, Current Revision
- E. 3M Cartridge Service Life Interactive Program
- F. Australian Standards AS/N25 1715 1994. Selection, Use, and Maintenance of Respiratory Protection Devices
- G. Australian Standards HB9-1994. Occupational Personal Protection
- H. AIHA, The Occupational Environment Its Evaluation and Control

The following documents are PDF files which must be read with Adobe Reader:

NIOSH Respirator Decision Logic

- J. NIOSH Guide to Industrial Respiratory Protection
- K. Attachment 42-1 Identifying When a Respirator is Needed
- L. Attachment 42-2 Voluntary Use of Respirators
- M. Attachment 42-3 Respirator Standard Operating Procedure
- N. Attachment 42-4 Respiratory Cartridge Change Schedule
- O. Attachment 42-5 Fit Test Results Form
- P. Medical Screening and Surveillance Program SMS 24

URS Corporation Health & Safety Program IDENTIFYING WHEN A RESPIRATOR IS NEEDED

Site Location:	Date:
Name of Person Performing Evaluation:	
Project:	
Answer the questions below for the jobs you are checked, consult with a URS Corporation Health • if a respirator is truly needed for the job, as w	and Safety Professional to determine:

- · the type of respirator needed for the job.

MATERIAL USED OR PROCESS TO BE PERFORMED	YES Respirator may be needed	NO	NOTES
Abrasive Blasting			
Abrasive blasting (with any type of grit or material) will be performed.			
Employee will fill abrasive blasting pots or perform clean-up activities.			
Employee will be in a contained area where abrasive blasting is taking place.			
Acids			
Liquid or powder acids will be used in a situation where acid vapors, mists or dust may be breathed.			
Adhesives			
Aerosol-propelled adhesives are to be used in areas where there is no or insufficient local exhaust ventilation.			
Two-part adhesives (mix part one with two, let set then use) are to be used in areas where there is limited ventilation.			
Alkalis/Bases/Caustics			
Powdered alkalis will be used in a situation where an airborne dust may be breathed.			
Asbestos Abatement			
Asbestos will be removed, repaired or sampled.			
Employees will be inspecting or overseeing areas where asbestos will be removed or disturbed.			

MATERIAL USED OR PROCESS TO BE PERFORM	YES Respirator may be needed	NO	NOTES
Cleaning Compounds			
 Degreasers or carbon removers will be used in are 	as		
where local exhaust ventilation is not provided.			
 Aerosol propelled cleaning compounds will be use 			
in areas where there is no local exhaust ventilation			
Degreasers or carbon removers will be used in voids, tanks, or other confined spaces.			
Corrosion Preventive Compounds			
Corrosion prevention compounds, including chemi	cal		
conversion compounds and corrosion inhibitors, w			
be used in areas where there is no local exhaust	Ì		
ventilation.			
Detergents/Soaps	Ì		
Ammonia based detergents will be used in large	.		
quantity (more than five gallons) in areas where lo	car		
exhaust ventilation cannot be provided. Large quantities (5 or 55 gallon containers) of high			
pH powder detergent/soap will be used in a situati			
where dust may be breathed.			
Fuels (including regular or unleaded gasoline, kerose	ne,		
diesel fuel, JP-5)			
Employees will be inside unventilated fuel cells or	j		
other confined spaces containing fuels.			
Grinding, Cutting, Sanding			
Cutting, grinding or sanding surfaces that have continue sentings sentings sentings sentings sentings.			
coatings containing lead, cadmium, chromium, zin or beryllium.			
 Cutting, grinding or sanding surfaces that are 			
concrete or glass without use of ventilation or water	er.		
Hazardous Waste Sites		······································	
Employees will be performing tasks on a hazardout	IS		
waste site that requires the use of respirator (as			
indicated in the site safety & health plan).			
Employees will be performing site assessments or patential hazardays wants sites.	ו		
potential hazardous waste sites. Hydraulic Fluids (including petroleum-based fluids,			
synthetic fire-resistant fluids, and water based fire			
resistant fluids)			
Hydraulic fluids and the vapors generated will not	be		
exhausted using local exhaust ventilation.		1	
Synthetic fire-resistant fluids or water-based fire-			
resistant fluids will be used in an area where the a	ir		
is contaminated with visible mist or spray from			
hydraulic fluids.		L	<u> </u>

MATERIAL USED OR PROCESS TO BE PERFORMED	YES Respirator may be needed	NO	NOTES
Inspection Penetrants (including Flouro-finder, water			
indicating pastes, and penetrant removers)			
An aerosol-propelled inspection penetrant will be			:
used in an area where local exhaust ventilation			
cannot be provided, or in a situation where the			
solvent vapors can be breathed.			
Lead Abatement Activities			
Lead containing materials will be disturbed, removed			
or sampled.			
Employees will be inspecting or overseeing areas			
were lead will be removed or disturbed.			
Lubricants/Oils			
Aerosol lubricants/oils will be sprayed with no			
immediate exhaust ventilation.			
Oxidizers (materials that give off oxygen including			
chlorine laundry bleach, calcium hypochlorite, calcium			
oxide, oxygen candles, lithium hydroxide, hydrogen			
peroxide, and sodium dichromate)			
Oxidizers containing organic chlorine will be used in			
a situation where the dusts/vapors may be breathed.			
Powdered oxidizers will be used in a situation where			
airborne dust may be breathed.			
Paint Materials (including paints, primers, thinners,			
enamels, lacquers, strippers, coatings and varnishes)			1
Paint materials will be spray applied in areas where			
there is no local exhaust ventilation.			
Two part (mix part a with part b, let set, then apply)]		J
polyurethane or epoxy polyamide paints will be brush			
or spray applied.	İ		
Paints containing lead, chromium, cadmium,			
beryllium, and zinc (refer to the MSDS).]		
Paint materials will be applied in confined spaces.		· · · · · · · · · · · · · · · · · · ·	
Solvents (including hydrocarbon solvents such as			
acetone, methyl ethyl ketone, toluene, xylene, and			
alcohols, as well as mixed solutions like antifreeze, heat transfer fluid, turpene, dope and naphtha thinner)			†
			1
Local exhaust ventilation will not be provided and work will involve breathing solvent vapors.			
work will involve breathing solvent vapors.			
Solvents will be used within confined spaces. Solvents will be applied using agreeds.			
Solvents will be applied using aerosols. Thermal Inculation (including exhauts), non-exhauts.			
Thermal Insulation (including asbestos & non-asbestos			
materials like pipe lagging, fiberglass insulation, boiler			
insulation, packing materials and floor/ceiling tiles)			
Insulation will be disturbed, removed or sampled.	L		

MATERIAL USED OR PROCESS TO BE PERFORMED	YES Respirator	NO	NOTES
	may be needed		
Water Treatment Chemicals (includes corrosive			
chemicals such as tri-sodium phosphate, hardness			
buffer, tritrating solution, morpholine, caustic soda, citric)
acid and nitric acid as well as toxic chemicals such as	1		
mercuric nitrate, hydrazine, EDTA and sodium nitrate)	1		
Morpholine, EDTA, or harness buffer/titrating			
solution is to be used in poorly ventilated spaces.]		
Powdered water treatment chemicals will be used in			
a situation where chemical dusts may be breathed.			
Welding/Brazing			
Welding will be performed in confined spaces.	1		}
Welding galvanized metal or stainless steel.	ļ		
Brazing with cadmium or lead.			
For Any of The Above Listed Activities	!		
A employee will be in the immediate area - within 10			1
feet of the job or operation, or	1		ļ
Employee will be inside confined space where			ļ
activities are taking place, or	[
Employee will be inside a "controlled area" such as	1		1
found in asbestos abatement, lead abatement,			
radiation control area, or a hazardous waste site.			
Material Safety Data Sheets			
For any chemical product used, a respirator is			
recommended.			
Product Labels			
For any chemical or process that indicates			
respirators should be used.			
Product Use Instructions	1		
For any product used, instructions indicate a respirator	}		
should be used.	ļ		
Standard Operating Procedures	1		
A Standard Operating Procedure indicates the use of a			
respirator.	l		<u> </u>

URS Corporation Health & Safety Program VOLUNTARY USE OF RESPIRATORS

Instructions: Have the employee that is opting to use a respirator for non-overexposure conditions read this page, then sign on the bottom of the page. Forward a copy of the signed form to the Regional Training Records Administrator, and maintain a copy in the employee's personnel file.

Respirators are an effective method of protection against designated hazards when property selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for employees. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the employee. Sometimes employees may wear respirators to avoid exposures to hazards, even if the amount of the hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your own voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not pose a hazard

You should do the following:

- 1. Read and follow all instructions provided by the manufacture on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
- Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety & Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear o the respirator or respirator packaging. It will tell you what the respirator is designed for and how it will protect you.
- 3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect you against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, fumes, smoke or very small solid particles.
- 4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.
- 5. If you have any health conditions (asthma; high blood-pressure; emphysema; heart disease) that could be aggravated by using a respirator, you should check with your doctor before using one.

I have read and understand this information on:	(date)
Employee's name:	
Employee's signature:	

URS Corporation Health & Safety Program RESPIRATOR STANDARD OPERATING PROCEDURE

Job	b Task Reviewed:	
Dat	te Reviewed:	
	sk Reviewed by:	
AD	MINISTRATIVE PROCEDURES	
2. 3.	All respirator users must be medically qualified to use respirators. Point of contact for the Regional Medical Surveillance Administrator. Respirator users must be trained annually in respirator use and fit tested annually. Respirator will be used only by the person to whom it was issued. Persons using glasses who are required to use a full-face respirator may use contact leyeglass inserts designed for the respirator.	-
GU	JIDANCE FOR SELECTION OF RESPIRATOR & CARTRIDGES/FILTERS	
1.	respirato	ors are
	currently being issued and used for the following job activity:	
2.	The respirator will be equipped with the following cartridges/filters:	
3.	Filters are to be changed when the breathing resistance increases.	
4.	Cartridges are to be changed:	or when the
	contaminant you are protecting yourself from can be smelled or tasted.	
FIT	TTESTING & FIT CHECKING	

- 1. Fit testing is required annually. To arrange for fit testing call your local safety representative.
- 2. Respirator users will "fit check" the respirator every time the respirator is put on:
- · Negative Check cover filters/cartridges with palms of hands and breath in, leakage should not be detected around the face seal of the respirator. Do not use if leakage is detected.
- · Positive Check cover the exhalation valve cover with palm of hand and blow out slightly, leakage should not be detected around the respirator seal.
- · For Air Supply Respirators kink or close off air supply hose and breath in, leakage should not be detected around the face seal of the respirator.

CLEANING & MAINTENANCE OF RESPIRATOR

- 1. Clean and disinfect respirator after every use.
- 2. Inspect respirator after every day in use to ensure parts are not missing. Replace missing parts from stock supply.
- 3. Store clean respirator in labeled plastic bag out of direct sunlight.4. Do not alter respirator in any way.

URS Corporation Health & Safety Program RESPIRATOR CARTRIDGE CHANGE SCHEDULE

A cartridge change schedule must be developed for cartridges or canisters used with air purifying respirators that do not have an End of Service Life Indicator (ESLI). The purpose of this is to prevent contaminants from breaking through the respirator's sorbent cartridge(s), and thereby over-exposing employees. NIOSH has approved ESLIs for only four cartridges or canisters (mercury vapor, carbon monoxide, ethylene oxide, and hydrogen sulfide). Historically we have relied on the warning properties (odor, irritation) of a contaminant to dictate cartridge change. OSHA no longer allows this as the sole basis for changing respirator cartridges. In developing a change schedule the following factors should be considered:

- Contaminants.
- · Concentration.
- Frequency of use (continuously or intermittently throughout the shift).
- Temperature and humidity.
- Work rate.
- The presence of potentially interfering chemicals.

The worst case conditions should be assumed to avoid early breakthrough. This must be documented in the project health and safety plan or, in the cases of office or labs, in the site specific Respiratory Protection Program.

Sources of Help

Manufacturers

3M has an interactive "Cartridge Service Life" program that can be downloaded for free (http://www.mmm.com/market/safety/ohes2/index.html)

This program will estimate cartridge service life for 3M products against many contaminants. The program does not evaluate the service life against mixtures (multiple contaminants). Because of the complexity in evaluating mixtures, OSHA offers the following guidance:

- When the individual compounds in the mixture have similar breakthrough times (i.e., within one order of magnitude), service life of the cartridge should be established assuming the mixture stream behaves as a pure system of the most rapidly migrating component with the shortest breakthrough time (i.e., sum up the concentration of the components).
- Where the individual compounds in the mixture vary by 2 odors of magnitude or greater, the service life may be based on the contaminant with the shortest breakthrough time.

Rule of Thumb ("The Occupational Environment - Its Evaluation and Control)

- If the chemical's boiling point is >70°C and the concentration is less than 200 ppm you can expect a service life of 8 hours at a normal work rate.
- Service life is inversely proportional to work rate.
- Reducing concentration by a factor of 10 will increase service life by a factor of 5.
- Humidity above 85% will reduce service life by 50 %.

OSHA Interpretation

The OSHA inspection procedures for the respiratory protection standard specifies that where contaminant migration is possible, respirator cartridges/canisters should be changed after each work shift where exposure occurs unless there is objective data to the contrary (desorption studies) showing the performance in the conditions and schedule of use/non-use found in the workplace.

Respiratory Fit Test Record

Attachment 42-5

Name: Social Security N		Social Security No:				
Company/Office:		Last Medical Exam:				
Fit Test Date:		Corrective Lenses Needed:	Yes 🗆 No 🗆			
Briefed on fundamental principles maintenance and storage of equip		on, use, selection, inspection cleaning	^{ng,} Yes□ No□			
Isoamyl acetate odor recognition			Yes 🗆 No 🗆			
	RESPIRATOR 1	RESPIRATOR 2	RESPIRATOR 3			
Equipment Type						
Manufacturer's Name						
Model						
Size						
Facepiece Composition (Rubber/Silicone)						
TEST PERFORMED	RESPIRATOR 1	RESPIRATOR 2	RESPIRATOR 3			
Negative Pressure Test:	P 🗆 F 🖂	P 🗆 F 🗆	PD FD			
Positive Pressure Test:	P 🗆 F 🗆	P □ F □	P 🗆 F 🗀			
Isoamyl Acetate Vapor Test:	P 🗆 F 🗆	P 🗆 F 🖂	P 🗆 F 🗖			
Irritant Smoke Test:	P 🗆 F 🗆	РП ГП	P □ F □			
This qualitative fit test pro CFR 1910.134, Appendix /		pted from OSHA Respiratory	Protection Standard 2			
Examiner's Name (Please Print)	Examine	er's Signature	Date			
Employee's Signature	Date					

URS

URS Corporation Health & Safety Program INDUSTRIAL HYGIENE MONITORING FORM

Social Security # Project Number Project Name and Location Weather Conditions Sample type Personal	Project Info	Name					Date	
Project Number Project Name and Location Weather Conditions Sample type Personal D Area D URS Control Number: Sample location: Pump Manulacturer: Sample media: Pump Model Number: Lot Number: Pump Serial Number: Contaminant sampled: Analytical Method: Sample Information Sample ID Sample Number Rate Time Time Time (mins) (liters) PPE Used PPE Used Corresponding Photographs Sample 1.D. Roll No., Exposure No. DESCRIPTION Stre Actioniss DescriptionComments.	C = =!=1 C						Date	
Project Name and Location Weather Conditions Sample type Personal Area URS Control Number: Sample location: Pump Manufacturer: Sample media: Pump Model Number: Lot Number: Pump Serial Number: Contaminant sampled: Analytical Method: Sample Information Sample Information Sample Information Sample Location Number Rate Time Time Time (filters) PPE Used PPE Used Corresponding Photographs Sample LD. Roil No., Exposure No. Ster Actions Description Commences:								
Sample type Personal Area URS Control Number	•	<u> </u>						
Sample type Personal								
Sample location: Sample media: Lot Number: Lot Number: Pump Model Number: Pump Serial Number: Pump Serial Number: Pump Serial Number: Analytical Method: Sample Information Sample I.D. Sample I.D. Pump Number Rate Pump Start Stop Elapsed Volume Time Time (mins) (liters) PPE Used Corresponding Photographs Sample I.D. Rate No., Exposure No. DESCRIPTION Sample I.D. Sample I.D. Sample I.D. Photo Number Rate DESCRIPTION	Weather Co	onditions						
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Lot Number: Pump Serial Number: Contaminant sampled: Analytical Method: Sample Information Sample ID. Sample Pump Flow Start Stop Time Time (mins) (liters) PPE Used PPE Used Corresponding Photographs Sample LD. Number Roll No. Exposure No. Especial Number Description Sample LD. Sample Pump Rate Time Time Time (mins) (liters) DESCRIPTION Start Stop Elapsed Volume Time (mins) Plans (liters) Volume Time (mins) Plans (liters) Output Description (liters)								
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Corresponding Photographs Sample I.D. Number Roll No., Exposure No. Site Activities Description/Commers:	Hamber		11011201	Titalo		1	1	1
Corresponding Photographs Sample I.D. Number Roll No., Exposure No. Site Activities Description/Commers:								
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URS SAFETY MANAGEMENT STANDARD Personal Monitoring (Industrial Hygiene)

1. Applicability

This standard applies to URS operations where employees may be exposed to unacceptable concentrations of hazardous air contaminants.

2. Purpose and Scope

This standard is intended to assist and provide guidance to URS personnel that need to conduct personal industrial hygiene monitoring

Personal monitoring is to be conducted under the following conditions:

- A. Where directed by a site-specific health and safety plan.
- B. Where employees are exposed to known or suspected human carcinogens.
- C. Where regulations require "initial exposure assessments." The only exception to conducting an "initial exposure assessment" where there is a regulatory requirement to do so is when similar exposure assessments have been conducted under similar site conditions within one year prior to the start of work on the current project.

Retain a copy of the referenced initial exposure assessment and place it in the Project Safety File.

2. Implementation

Laboratory Locations - Implementation of this standard is the responsibility of the Laboratory Manager.

Field Activities -

Implementation of this standard is the responsibility of the Project Manager.

3. Requirements

- A. Procedures for Personal Industrial Hygiene Monitoring
 - 1. Collect samples using the applicable methodologies established by either NIOSH or OSHA. Require the selected laboratory to utilize the applicable analytical methodologies.

URS SAFETY MANAGEMENT STANDARD Personal Monitoring (Industrial Hygiene)

- 2. Document personal monitoring activities using a URS Industrial Hygiene Monitoring Form (Attachment 43-1) and require that all Chain of Custody forms are properly completed.
- B. Evaluation of Personal Monitoring Results
 - 1. Require that the analytical results be evaluated by a URS Health and Safety Program Representative.
 - 2. Obtain a written evaluation report from the URS Health and Safety Program Representative. If exposures exceed the Action Level and/or Permissible Exposure Limit for the air contaminant(s) of concern, a verbal report is to be made to the Project Manager immediately, and the evaluation report will include required corrective actions.
 - 3. Evaluation reports are to be completed within five working days of the receipt of the analytical results.
- C. Communication of Sample Results and Evaluation
 - 1. Provide copies of the evaluation report to the employee(s) monitored and to employees working in the area for whom the exposures could be representative.
 - 2. Provide a copy of the evaluation report and monitoring data to the Medical Surveillance Administrator.
- D. Corrective Actions

Implement required corrective actions immediately.

4. Documentation Summary

Maintain in the Project Safety File:

- A. Calibration data
- B. Completed IH Monitoring Form(s)
- C. Evaluation Report with sample results
- D. Relevant prior initial exposure assessments
- E. Provide to affected employees:

URS SAFETY MANAGEMENT STANDARD Personal Monitoring (Industrial Hygiene)

- · Evaluation Report with sample results
- F. Provide to the Medical Surveillance Administrator:
 - Evaluation Report with sample results
 - · List of employees affected by the sampling

5. Resources

- A. OSHA Analytical Methods
- B. OSHA Chemical Sampling Information
- C. <u>American Industrial Hygiene Association</u>, <u>The Occupational Environment</u>, <u>Its Evaluation and Control</u>.
- D. <u>American Conference of Governmental Industrial Hygienists</u>. <u>Air Sampling Instruments for Evaluation of Atmospheric Contaminants</u>.
- E. U.K. 'Control of Substances Hazardous to Health'
- F. NIOSH Analytical Methods
- G. Attachment 43-1 IH Monitoring Form

any outward or downward direction with no more than 3 inches (7.6 cm) of deflection.

- b. Midrails must be installed 21 inches (53 cm) above the walking/working surface and be capable of withstanding, without failure, a minimum force of 150 pounds (68 Kg) in any outward or downward direction.
- c. Posts must be spaced not more than 8 feet (2.5 meters) apart on centers.
- 3. Require that there are no openings more than 19 inches (48 cm) wide in any guardrail system.
- 4. Do not use plastic or steel banding as toprail or midrail.
- 5. Provide toprails and midrails of at least one-quarter inch (6 mm) nominal thickness or diameter, and smoothly surfaced to prevent cuts and punctures.
- 6. Flag the toprail with high-visibility material when using wire rope for toprails.
- 7. Erect guardrails on all sides when using guardrail systems around holes
- 8. When guardrails are used around holes that are used for access, such as ladderways, provide a gate or offset the guardrail so that a person cannot walk directly into the hole.
- 9. When guardrails are used at hoisting areas, place a chain, gate, or removable guardrail section across the access point when hoisting operations are not taking place.
- 10. Provide guardrail systems at all locations above dangerous equipment, whether 6 feet (2 meters) or not.
- 11. Provide guardrails at all wall openings where the outside bottom edge of the opening is 6 feet (2 meters) or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches (1 meter) above the walking/working surface.
- 12. Erect guardrail systems on all unprotected sides or edges of ramps and runways when such systems are used.

D. Personal Fall Arrest Systems

- 1. Provide and require the proper use of personal fall arrest systems on all unprotected elevations 6 feet (2 meters) or more above a lower level. Where these systems are impractical, an alternative form of fall protection as outlined elsewhere in this procedure must be provided.
- 2. All aspects of personal fall protections systems must be designed, installed, and used under the supervision of a qualified person.
- 3. Maintain a safety factor of at least 2 in all components of a personal fall protection system.
- 4. Safety belts (body belts) are prohibited.
- 5. Use only full body harnesses, shock-absorbing lanyards, lifelines, and anchorage points which meet the following criteria:
 - a. Body harness design and construction must meet the specifications set forth in 29 CFR 1926.500-.503.
 - b. All snaphooks must be of the locking type.
 - c. Ropes and webbing used in lanyards, lifelines, and body harnesses must be made of synthetic fibers.
 - d. The attachment point (dee-ring) of a body harness must be located in the center of the wearer's back near shoulder level, or above the wearer's head.
 - e. Horizontal lifelines must be designed, installed, and used under the supervision of a qualified person; be capable of supporting at least 5,000 pounds (2,270 Kg) per employee attached; and maintain a safety factor of at least 2.
 - f. Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds (2,270 Kg).
 - g. Self-retracting lifelines and lanyards which limit free fall to 2 feet (60 cm) or less must be capable of sustaining a minimum tensile load of 3000 pounds (1,360 Kg) in the fully extended position.

- h. Self-retracting lifelines and lanyards which do not limit free fall to 2 feet (60 cm) or less, ripstitch, and other shockabsorbing lanyards must be capable of sustaining a minimum tensile load of 5,000 pounds (2,270 Kg) in the fully extended position.
- i. Anchorage points for personal fall protection systems must be independent of any anchorage point being used to support or suspend platforms and must be capable of supporting at least 5,000 pounds (2,270 Kg) per employee attached.
- 6. Inspect all fall protection components for wear, damage, and deterioration prior to each use.
- 7. Require employees to be familiar with the fitting and donning of body harnesses; proper tie-off techniques, and suitable anchorage points.
- 8. Instruct employees to rig fall protection such that they can neither free fall more than 6 feet (2 meters), nor contact any lower level.
- 9. Never tie off to guardrail systems or hoists.
- 10. Require employees to remain tied off 100% of the time at or above 6 feet (2 meters) by means of horizontal lifelines, vertical lifelines, a double lanyard system, or other suitable means.
- 11. Remove from service any component of a personal fall protection system that has been subjected to impact loading and do not use again until inspected by a competent person and determined to be undamaged and suitable for reuse.
- 12. Make provisions for the prompt rescue of personnel in the event of a fall, or require that employees are capable of self-rescue.
- 13. Provide separate vertical lifelines for each employee using a vertical lifeline. 5/8-inch (16 mm) nylon rope is recommended for lifeline use.
- 14. Protect lifelines against cuts and abrasions.
- 15. Use rope grabs to attach to vertical lifelines never use knots.

E. Safety Net Systems

- 1. Provide safety net systems at locations where a fall hazard of 6 feet (2 meters) or greater exists, and other forms of fall protection are not feasible. Where safety net systems are impractical, an alternative form of fall protection as outlined elsewhere in this procedure must be provided.
- 2. Require that safety net systems meet the criteria set forth in 29 CFR 1926.500 -.503.
- 3. Install safety nets as close as possible under the walking/working surface on which employees are working, but never more than 30 feet (9 meters) below this level.
- 4. Require that the potential fall area from the walking/working surface to the net is unobstructed.
- 5. Install safety nets with enough clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified below.
- 6. Extend the outer edge of the net 8 feet (2.5 meters) from the edge of the working surface when the vertical distance from the working level to the net is 5 feet (1.5 meters) or less.
- 7. Extend the outer edge of the net 10 feet (3 meters) from the edge of the working surface when the vertical distance from the working level to the net is 5 feet to 10 feet (1.5 to 3 meters).
- 8. Extend the outer edge of the net 13 feet (4 meters) from the edge of the working surface when the vertical distance from the working level to the net is greater than 10 feet (3 meters).
- 9. Conduct a drop test of the safety net after installation and before being used as a fall protection system; whenever relocated; after major repair; and at 6-month intervals if left in one place.
- 10. Conduct the drop test by dropping a 400 pound (180 Kg) sandbag, 30 inches (76 cm) in diameter, into the net from at least 42 inches (107 cm) above the highest walking/working level at which employees are exposed to a fall.

- 11. Inspect safety nets at least once a week, and after any occurrence which could affect the integrity of the system, for wear, damage, and deterioration. Remove defective nets and components from service.
- 12. Remove all materials, scrap, equipment, and tools which have fallen into the net as soon as possible, but at least before the next work shift.

F. Hole Covers

- 1. Provide covers in roadways and vehicle aisles that are capable of supporting at least twice the maximum axle load of the largest vehicle expected to cross over the cover.
- 2. Provide walking/working surface hole covers that are capable of supporting at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
- 3. Secure covers at the time of installation to prevent displacement by the wind, equipment, or employees.
- 4. Color code or mark all hole covers with the word "HOLE" or "COVER" to provide warning of the hazard.
- G. Safety Monitoring Systems, Warning Line Systems, and Controlled Access Zones.

Consult the local URS Health and Safety Representative or URS Health and Safety Manager prior to performing any roofing, overhand bricklaying, leading edge, or other elevated work which may require the use of one or more of these systems.

H. Protection from Falling Objects

- Install toeboards along the edge of the overhead walking/working surface.
- Require that toeboards are a minimum of 3 ½ inches (9 cm) in height; that they are capable of withstanding at least 50 pounds (22 Kg) of force applied in any downward or outward direction; and that there is no more than ¼ inch (6 mm) clearance between the toeboard and the walking/working surface.

- 3. Install paneling or screening from the top of the toeboard to the top rail or midrail when tools, equipment, or materials are piled higher than the top of the toeboard.
- 4. Provide sidewalk sheds or canopies as appropriate. See <u>SMS 11</u>, "Demolition".

5. Documentation Summary

Place in the Project Safety Files:

- A. Competent Person Qualifications.
- B. Employee Training Documents.

6. Resources

- A. U.S. OSHA Standard Fall Protection 29 CFR 1926, Subpart M (http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_M.html)
- B. U.S. OSHA Technical Links Fall Protection (http://www.osha-slc.gov/SLTC/fallprotection/index.html)
- C. U.K. Construction (Health, Safety and Welfare) Regulations
- D. ANSI A10.11-1971 (http://web.ansi.org/public/std_info.html)
- E. ANSI A12.1-1973 (http://web.ansi.org/public/std_info.html)
- F. Australian Standards AS/N25 1891.1 to .3 Industrial Fall-Arrest Systems and Devices

URS SAFETY MANAGEMENT STANDARD Back Injury Prevention

1. Applicability

This procedure applies to URS operations where personnel perform manual lifting.

2. Purpose and Scope

The purpose of this procedure is to prevent back injuries to URS personnel.

3. Implementation

Office Locations - Implementation of this procedure is the responsibility of the Office Manager.

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Safe Lifting Practices in the Office

- 1. Require that personnel receive the training described in (C) below.
- Evaluate all assignments that involve lifting, such as moving boxes of files and paper, computer equipment, and the like to see that the task can be completed without risk of back injury to assigned personnel.
- 3. Provide material handling devices, such as carts and dollies, to assist in the safe moving of materials.
- 4. Obtain outside assistance, such as contract movers, if the job cannot be safely accomplished by URS personnel.
- 5. Require that heavier items are stored on lower shelving units.

B. Safe Lifting Practices in the Field

- 1. Recognize that field assignments tend to be lifting-intensive, and that URS has a duty to provide the means by which personnel can perform lifting duties without risk of injury.
- 2. Require that personnel receive the training described in (C) below.

URS SAFETY MANAGEMENT STANDARD Back Injury Prevention

- 3. Evaluate all field assignments that involve lifting to see that the tasks can be completed without risk of back injury to assigned personnel.
- 4. Provide material handling devices, such as carts, dollies, trucks with lift gates, to assist in the safe moving of materials. If required, assign additional personnel to the task.
- 5. Direct field personnel not to assist in lifting tasks that are normally undertaken by subcontractor personnel.
- 6. Contact a URS Health and Safety Program Representative when assistance is necessary to evaluate a lifting task that may pose a back injury risk to assigned personnel.

C. Training

- 1. Require that personnel who may have lifting as part of their duties receive training that includes the following topics:
 - Showing personnel how to avoid unnecessary physical stress and strain.
 - b. Teaching personnel to become aware of what they can comfortably handle without undue strain.
 - c. Instructing personnel on the proper use of equipment.
 - d. Teaching personnel to recognize potential hazards and how to prevent or correct them.
- 2. This training must be completed prior to an employee being assigned to a task that involves lifting.

D. Office Moves and Relocations

- 1. Utilize professional movers (who are appropriately insured) to move office furniture such as desks, file cabinets, and bookcases, even if such a move is only between offices or cubicles at a particular location (on-site move).
- 2. Utilize professional movers for intensive moving of file boxes and other heavy materials.

URS SAFETY MANAGEMENT STANDARD Back Injury Prevention

E. Material Packaging

- 1. Use only smaller size (<18") file ("Banker") boxes for file storage, as the larger (>18") boxes are awkward and readily overloaded.
- 2. Use only smaller coolers for field samples, as the larger coolers are awkward and readily overloaded.

5. Documentation Summary

File the following documents in the Office Health and Safety File

Training rosters

File the following documents in the Project Health and Safety File

Training rosters

6. Resources

A. Work Practices Guide for Manual Lifting, NIOSH

1. Applicability

This procedure is applicable to subcontractors retained by URS to perform construction (including drilling and excavation), alteration, demolition, and/or repair activities utilizing their own workforce or equipment. This procedure is applicable to the operations of subcontractors and sub-subcontractors of any tier.

This procedure does not apply to third party contractor operations where there is no subcontract relationship between the contractor and URS Corporation. Health and safety issues regarding third party contractor operations are governed by project specific contracts and are not covered by this standard.

2. Purpose and Scope

This procedure provides guidelines on the pre-evaluation of subcontractor safety programs. t also provides guidance on contractual risk management, subcontractor safety performance on the job site, and the responsibilities of the Project Manager with respect to subcontractor jobsite safety performance.

It is recommended that each URS Corporation subcontractor be evaluated at least annually using Attachment 46-1, "Subcontractor Safety Evaluation Form," in order to perform work on any new URS Corporation projects.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Guidelines

- A. Pre qualification of Subcontractor The Project Manager shall complete the following procedures for all subcontractors retained on projects covered by this standard (the PM should also require subcontractors to follow these procedures with respect to pre-qualification of subsubcontractors of any tier):
 - 1. Request all subcontractor candidates to complete the attached "Subcontractor Health and Safety Evaluation Form" (Attachment 46-1).
 - 2. Conduct an assessment of each subcontractor's qualifications with respect to the subcontractor health and safety evaluation criteria contained in Attachment 46-2.

- 3. Verify that subcontractors meet the insurance requirements as stated in <u>Attachment 46-2</u> or as approved by Counsel.
- 4. If the subcontractor has been successfully evaluated within the last 12 months, that evaluation may be substituted.
- 5. For long term projects, this evaluation should be updated within 12 months of the previous evaluation.
- B. Contractual and Risk Management Requirements of Subcontractors
 - 1. Ensure that subcontractor is contractually bound to comply with applicable client and URS Corporation Health and Safety Program requirements.
 - Ensure that subcontractor is contractually bound to develop additional safety procedures for work that is exclusive to their activities on the site and for which they may have superior knowledge.
 - Assess compliance of subcontractor's insurance with the URS Corporation subcontract requirements (including, but not limited to, necessary types and amounts of coverage, URS Corporation additional insured endorsement, etc.).
 - 4. Ensure that URS Corporation has the right in its subcontract, without liability to the subcontractor, to stop the subcontractor's work in the event of any violations of the applicable Health & Safety Plan.
- C. Subcontractor Safety Representative
 - 1. Require each subcontractor to appoint a Subcontractor Safety Representative (SSR) who:
 - a. Is knowledgeable of the subcontractor's activities.
 - b. Understands the safety requirements of the subcontractor's activities.
 - c. Has the ability to recognize and the authority to correct safety deficiencies and execute a stop work order should an imminent danger arise.

- d. Has the responsibility for the administration of the subcontractor Health and Safety Program.
- e. Will serve as the direct contact with URS Corporation regarding resolution of Health and Safety issues.

D. Communication

- 1. Provide the SSR with information regarding Site Safety Program including but not limited to:
 - a. Client Requirements.
 - b. URS Corporation Site Safety Program.
 - c. Site Hazard Communication Program.
 - d. Site Emergency Action Plan.
 - e. Any additional safety information from other contractors or subcontractors working on the site.
- 2. Provide SSR with name of URS Corporation project contact and alternate for addressing site Health and Safety issues.
- 3. Require the participation of subcontractors in all Site Safety Briefings.
- Require subcontractor compliance with all safety directives and/or stop work orders issued by the URS Corporation site representatives.

E. Subcontractor Safety Performance

- 1. To the extent reasonable in light of URS Corporation's scope of work under the client contract, visit the site and periodically observe subcontractors operations (i.e., conduct spot checks) to assess whether subcontractor appears to be conducting its operations in accordance with applicable health and safety requirements. Periodically review any required subcontractor health and safety written documentation for compliance with applicable requirements.
- 2. In the event that deficiencies are observed immediately bring them to the attention of the SSR for resolution.

- 3. In the event of observation of an "Imminent Danger" situation (i.e. involving a situation that could result serious injury or death), immediately contact the SSR and stop the work.
- 4. Investigate all injuries/illnesses related to subcontractor operations to identify causes and effect corrective actions.
- In the event of serious and/or continuing subcontractor breaches of applicable health and safety requirements contact legal counsel to assess whether formal contractual action is appropriate under the subcontract.

5. Documentation Summary

- A. File in the Project Safety File
 - 1. Subcontractor Health and Safety Evaluation Form.
 - 2. Applicable and current Insurance Certificates.
 - 3. Names and telephone numbers of SSR for each subcontractor.
 - 4. Verification of Health and Safety documents transmitted to subcontractors and received from subcontractors.
 - 5. Identified safety deficiencies as applicable for subcontractors and verification of correction of conditions.
 - 6. All other safety related documentation between URS Corporation and subcontractor such as training certifications, etc.
 - 7. Subcontractor safety plan, incident reports and resolution reports.

6. Resources

- A. Federal OSHA Workplace Injury and Illness statistics (http://www.osha.gov/oshstats/work.html)
- B. Managing Subcontractor Safety, Prepared by The Construction Industry Institute, Safety Task Force, Publication 13-1, The University of Texas at Austin, Austin, Texas, 1991 (http://www.construction-institute.org/)
- C. American National Standard Construction and Demolition Operations --Safety and Health Program Requirements for Multi-Employer Projects,

ANSI A10.33-1992, National Safety Council, Itasca, Illinois 60143-3201 (http://www.nsc.org)

- D. "Liability, OSHA and the Safety of Outside Contractors," Professional Safety, American Society of Safety Engineers, January 1993 (http://www.asse.org)
- E. "Proactive Construction Management; Dealing With the Problem of Subcontractor Safety," Professional Safety, American Society of Safety Engineers, January 1990 (http://www.asse.org)
- F. "Design Professional Liability Under OSHA," Presented by Thomas F. Holt, Jr., HWAC Lawyer's Roundtable, June 14, 1995 (to be Published) (http://www.hwac.org)
- G. "Occupational Injury and Illness Rates by SIC", Bureau of Labor Statistics, U. S. Department of Labor (http://stats.bls.gov/sahome.html)
- H. Attachment 46-1 Subcontractor Safety Evaluation Form
- I. Attachment 46-2 Subcontractor Evaluation Criteria



Attachment 46-1

SUBCONTRACTOR SAFETY EVALUATION FORM

It is the policy of URS to provide a safe and healthful environment for all of its employees through the prevention of occupational injuries and illnesses. As such, URS considers safety as paramount and requests the following information of all subcontractors.

Company Name			
Company Address			
Submitted By			
Title			
Phone			
Fax			
Type of services performed			
Standard Industrial Classification (SIC) Code			
Number of employees in company			
Date of submittal			
SAFETY PERFORMANCE	DATA		
Has your company performe previously?	ed work as a subcontractor to URS	O Yes	O No
If yes, explain the nature of the v telephone number.	work, project location and project date. Ur	RS Project Manag	er and
	and the second s		
· · · · · · · · · · · · · · · · · · ·	Company of the Compan		



b)

c)

Health and Safety Program

Attachment 46-1

SUBCONTRACTOR SAFETY EVALUATION FORM

2.	Worker	Compensation	Experience	Information
----	--------	--------------	------------	-------------

a)	List your Interstate Worker Compensation Experience Modification Rate (EMR) for the last
	three full years below:

Year	EMR	Carrier	Policy Number
state (List state	inting for highest EMD	ctata)	
Year Year	istics for highest EMR EMR	Carrier	Policy Number
			ent page from your policy lis ormation on their letterhead
=	or evenede 1.0 for any	one or more years above	v places explain:

3. Workplace Injuries and Illnesses

YE	AR				
PRO	OVIDE THE FOLLOWING INFORMATION:	 	1		
A.	Number of Fatalities		1		
В.	Number of cases that involved either lost workdays or restricted duty (Totals from Columns 1 and 8 of OSHA 200 Log)		:		
C.	Number of cases involving recordable injuries without lost workdays (Totals from Columns 6 and 13)	 			
Ď.	Total Cases (Sum of Items A, B, and C above for each given your	•	· · ·		

Attach description of Event



Attachment 46-1

SUBCONTRACTOR SAFETY EVALUATION FORM

YEAR	1	
PROVIDE THE FOLLOWING INFORMAT	ION:	
E. Total hours worked		
F. OSHA Total Case Incident Rate ²		
G. OSHA Lost Workday Case Incident	Rate ³	
Describe any workplace safety regulate received in the past three years. Expl Describe the resolution of any serious where more space is required.	ain the nature of the citation, cla	assification, and final fine.
Year	Number of Citations	Final Fine Amount
Citation Statement		
Year	Number of Citations	Final Fine Amount
Citation Statement		
² Incident Rate (Item F) = <u>Total_Cases (Ite</u> Total hours wo	em D) x 200,000 rked (Item E)	
³ Lost Workday Case Incident rate = <u>Total</u>	Lost Workday Cases (Item B) >	< 200,000
	otal hours worked (Item E)	St. St. and C. Carrier



Attachment 46-1

SUBCONTRACTOR SAFETY EVALUATION FORM

5.	Has your company received any Willful violations?	O Yes	O No
6.	Does your company maintain a written Health and Safety program? If yes please include a copy of the Table of Contents.		O No
7.	Does your firm have a safety officer? If yes, please provide name and telephone number	O Yes	O No
	Name		
	Telephone		
8.	Is your company capable of preparing safety procedures specific to the work proposed for this project?	OYes	O No
R	ISK MANAGEMENT / INSURANCE DATA		
1.	Does your firm have insurance coverage for commercial liability and automobile liability without limits of at least \$1,000,000? (Note that certain URS client contracts require insurance in excess of the levels noted above. Insulty to supply insurance at levels required by URS' client contract could result in disqualification.)	OYes	O No
2.	Are you able to provide URS with insurance certificates naming URS and if requested, URS' client as an additional insured?	OYes	O No
3.	Please provide proof of current Worker's Compensation and Employers Liability Insurance coverage (attach certificate).		



Attachment 46-1

SUBCONTRACTOR SAFETY EVALUATION FORM

VERIFICATION OF DATA

Please have an officer of the Company sign below document is current and correct.	w certifying that the information provided in this
Name	
Title	
Signature	
Date	·
Misrepresentation of data requested is grounds f from future consideration.	or immediate termination of contracts and disqualification
URS Use Only Date Received:	
Evaluated by: Project	ct Manager
Referrals only required as per Attachment 2	
☐ Pass ☐ Fail	for evaluation: H&S Rep
Final Evaluation	Project Manager:
☐ Pass ☐ Fail	Signature:
	Date:



Attachment 46-2

SUBCONTRACTOR EVALUATION CRITERIA

Prior to engaging a subcontractor on a project, Project Managers are strongly recommended to ensure that the contractor has an effective safety program, is capable of conducting it's operations in a safe manner and has appropriate insurance coverage. The following guidelines shall be followed in determining whether the subcontractor may be used on a URS Corporation project.

GENERAL INFORMATION

The contractor must be able to complete the header section on Page 1 of the questionnaire including their Standard Industrial Classification. For assistance determining the SIC for a business refer to the Standard Industrial Classification Manual online at http://www.osha.gov/oshstats/sicser.html.

SAFETY PERFORMANCE DATA RESPONSES

The numbers in this section directly correspond to the questions in Attachment 46-1.

- 1. If yes, check safety performance history with previous URS Corporation Project Manager if unknown.
- 2. For any EMR listed as greater than 1.0 the contractor has failed the evaluation. Further consideration may not occur without referral to URS Corporation Health and Safety Program Professional in your Region for further assessment.
 - If all EMRs listed are 1.0 or below, continue with evaluation.
- 3. Determine the most recent OSHA Incident Rate and Lost Workday Case Rate for the subcontractors SIC. This may be done online at http://www.osha.gov/oshstats/work.html.
 - For rates in excess of the published averages the subcontractor has failed the evaluation. Further consideration may not occur without referral to URS Corporation Health and Safety Program Professional in your Region for further assessment.
 - If the rates are at or below the average for the subcontractors SIC, continue with the assessment.
- 4. Determine the subcontractor's citation history at http://www.osha.gov/cgi-bin/est/est1. Compare the published data to the contractor questionnaire. The subcontractor must explain any discrepancies.
 - Look for large numbers of serious and repeat violations. If the suggests a problem request information and refer to URS Corporation Health and Safety Program Professional in your Region for further assessment.

URS

Health and Safety Program

Attachment 46-2

SUBCONTRACTOR EVALUATION CRITERIA

- If subcontractor answers yes to willful violations request a detailed explanation and refer to URS Corporation Health and Safety Program Professional in your Region for further assessment.
- 6. For small subcontractors a no answer is not unexpected and may be acceptable with good EMR and OSHA statistics. Generally some minimal program is expected depending on the breadth and complexity of the work. Contact URS Corporation Health and Safety Program Professional in your Region for further assessment if you have any questions or doubts.
- 7. See 6.
- 8. It is expected that a subcontractor being hired to perform services on the project site should be the best prepared to address safety issues for their operations, especially when specialty work is being conducted or for work in which the subcontractor possesses superior knowledge of their operations.

A 'no' answer should be referred to the URS Corporation Health and Safety Program Professional in your Region for further assessment.

RISK MANAGEMENT/INSURANCE DATA

- 1. The inability to provide insurance coverage at or above \$1,000,000 requires referral to Counsel.
- 2. Proof of Workers Compensation Insurance is required. Refer any questions to Counsel.
- 3. Ability to provide Insurance Certificates naming URS Corporation as an additional insured is required. Refer any questions to Counsel.

1. Applicability

Office and field operations that ship hazardous materials (HazMat) must follow this Hazardous Material Shipping Program.

Hazardous materials may include, but are not limited to, compressed gases, laboratory reagents, field samples, hazardous wastes, and materials used for bench scale and pilot plant operations.

2. Purpose and Scope

This program was designed to provide a framework for compliance with the requirements of the U.S. Department of Transportation (DOT) 49 CFR and the International Air Transportation Association (IATA) for shipping hazardous materials by land or air.

3. Implementation

Office Locations - The Office Manager is responsible for implementing this program at company locations/facilities.

Field Activities - The Project Manager is responsible for compliance and implementation of this program at project sites.

4. Requirements

A. Staffing

Each project or location must ensure that awareness and function specific trained individuals are involved in the process of preparing hazardous materials for shipment.

Each location where HazMat shipping occurs or where HazMat employees are assigned must identify a local or regional Shipping Specialist.

B. General Procedures

- 1. Select the best way to ship the HazMat item based on the quantity, hazard(s), and mode of transportation (e.g., air, land, water).
- 2. Ensure package contents are compatible.
- 3. Package, mark, and label according to applicable regulations.

- 4. Complete the bill of lading or shipper's declaration for dangerous goods according to applicable regulations.
- 5. Follow hazard communication requirements:
 - a. Send a copy of the appropriate Emergency Response Guidebook page or material safety data sheet (MSDS) with each shipment.
 - b. Include the 24-hour emergency response phone number (CHEMTREC 800-424-9300 domestic, 703-527-3887 international) on the shipping paperwork.

C. Placarding Requirements

- 1. Placards must be offered to drivers if the amount of hazardous materials being shipped exceeds 1,000 pounds.
- 2. For extremely hazardous materials (e.g., severe explosives and toxics), any amount requires placarding.
- 3. "Limited quantities" are excepted from placarding.
- 4. URS employees transporting hazardous materials meeting DOT tracking and shipping requirements will obtain the proper Commercial Drivers License and endorsement.

D. Training

- Require employees who package, prepare paperwork, load and/or unload, and transport hazardous materials be trained to the appropriate level of activity:
 - a. Training is required prior to performing HazMat shipping activities.
 - b. Training is required when regulatory changes impact current procedures and every 2 years.
 - c. General awareness training is required for everyone who is involved in HazMat shipping. This training includes:
 - 1. Recognizing hazardous materials
 - 2. Penalties for not complying

3. Basic regulatory requirements

- d. Function specific training is required to ensure employees can perform the specific HazMat jobs safely and in compliance with applicable regulations.
- e. Driver's may be exempt from function specific training if the DOT's Materials of Trade (MOT) exception applies to the shipment. (See <u>Attachment 48-1</u> for information on this exception).

E. Special Requirements

- Some countries and transporters have more stringent requirements than DOT or IATA. For example, the United Parcel Service (UPS) publishes its own Guide for Shipping Ground and Air Hazardous Materials. URS shipping training and this program may not meet these additional requirements.
- 2. Contact the applicable shipping company or a URS Health and Safety Program Representative if you are unsure or suspect there may be additional, special requirements on a shipment.
- For international shipments an expediter may be required to ensure needed materials are not held in customs. It may be advisable to purchase hazardous materials once you arrive in your destination country.

5. Documentation

All files must be kept in a central location.

A. Training records

- 1. Sign-up sheet with list of employee names, date, management certification.
- 2. Successfully completed tests.
- 3. Outline of course materials.

6. Resources

- A. 49 Code of Federal Regulations, Parts 171-180, Subchapter C--Hazardous Materials Regulations.
- B. Dangerous Goods Regulations. <u>International Air Transport Association</u>. 40th Edition. Effective January 1, 1999.
- C. International Maritime Dangerous Goods Code. International Maritime Organization, Amendment 29-98.
- D. DOT Office of Hazardous Materials Safety
- E. URS HazMat Shipping Support Helpline 800.381.0664
- F. Attachment 48-1 Materials of Trade Summary

URS

Health and Safety Program MATERIALS OF TRADE (MOTs) SUMMARY

Attachment 48-1

The Department of Transportation (DOT) adopted the "Materials of Trade" or "MOTs" exception for companies that are not in the business of transporting chemicals. Because URS is in the business of environmental sampling and other field services, URS is able to use this exception. The exception is found in the Code of Federal Regulations: 49 CFR 173.6.

The MOTs exception allows URS Corporation employees to transport certain amounts of chemicals aboard their vehicles without preparing hazardous material paperwork or packaging the hazardous material in specification boxes using hazard labels and required markings.

MOTs must be packaged in the manufacturer's original packaging, or a packaging of equal or greater strength or integrity. Gases must be in DOT specification cylinders. If the inner container (such as the bottle) is secured against movement inside the vehicle (if it is kept in a cabinet or tool box), then no outer packaging (such as a cardboard box) is required. The MOT must be marked with a common name or the technical name.

No hazardous material training is required, except that the driver must be familiar with the MOTs exception. The driver is not allowed to exceed total aggregate weight of 440 pounds of MOTs aboard the vehicle.

The hazardous material classes and quantities of HAZMAT items typically transported by URS field can be transported as MOTs:

- The inner container of a Packing Group II and III material in Class 3, 8, 9, Division 4.1, 5.1, 5.2, 6.1, or ORM-D cannot exceed 66 pounds or 8 gallons each.
- A Division 2.1 or 2.2 cylinder cannot exceed 220 pounds.
- The inner container of a Packing Group II or II material in Division 4.3 cannot exceed 1 ounce.

Be careful not to exceed the 440-pound upper limit weight restriction.

URS SAFETY MANAGEMENT STANDARD Injury / Illness / Incident Reporting

1. Applicability

This procedure applies to URS Corporation offices and field operations.

2. Purpose and Scope

The purpose of this procedure is to provide guidance for the timely reporting of work related injuries, illness, and incidents.

3. Implementation

Office Locations - Implementation of this program is the responsibility of the

employee's Supervisor.

Field Activities - Implementation of this program is the responsibility of the

Project Manager.

4. Requirements

- A. Reporting: All employees shall immediately notify their appropriate level of management (line, project, and/or office) of a reportable incident. A reportable incident includes the following:
 - 1. An injury to any URS employee, subcontractor, client representative, or private citizen, even if the injury does not require medical attention;
 - 2. An injury to a member of the public occurring on a URS work site or possibly resulting from a URS or subcontractor activity or involving URS or subcontractor property, equipment, or resource;
 - 3. Illness resulting from suspected chemical exposure;
 - 4. Chronic or re-occurring conditions such as back pain or cumulative trauma disorders (example: carpal tunnel syndrome);
 - 5. Fire, explosion, or flash;
 - 6. Any vehicle accidents occurring on site, while traveling to or from client locations, or with any company-owned or leased vehicle;
 - 7. Property damage resulting from any URS or subcontractor activity:
 - 8. Structural collapse or potential structural hazards;

URS SAFETY MANAGEMENT STANDARD Injury / Illness / Incident Reporting

- 9. Unexpected release or imminent release of a hazardous material;
- 10. Unexpected chemical exposures to workers or the public;
- 11. A safety related complaint from the public regarding URS activities.
- 12. Any other significant occurrence that could impact safety.
- B. Actions: The following actions will be taken following a reportable incident:
 - 1. Employees:
 - a. If necessary, suspend operations and secure and/or evacuate the area;
 - b. Immediately notify your supervisor and/or project manager
 - c. Record information pertaining to the incident (e.g., time, date, location, name and company of person(s) involved, description of event, and actions taken);
 - d. Assist with incident investigation as directed by management;
 - e. Implement corrective actions as directed by management;
 - f. Do not discuss the incident with members of the news media or legal representatives (except URS legal counsel or your personal legal advisor) unless directed to do so by URS management;
 - g. Do not make statements pertaining to guilt, fault, or liability.
 - 2. Line/Project Management:
 - a. Review circumstances of the incident with applicable employee(s);
 - Notify local Health and Safety representative. If incident involves and an injury/illness of a URS employee, also notify the local Human Resources Representative;
 - c. Complete and distribute injury/incident report within 24 hours. (Note: If the employee is unable to complete the

URS SAFETY MANAGEMENT STANDARD Injury / Illness / Incident Reporting

report, another company employee, line manager, project manager, or local health and safety representative may complete the report.);

- d. Review and verify that necessary corrective actions are identified and implemented;
- e. Discuss with department or project staff the circumstances surrounding the incident and corrective actions taken.
- 3. Local Health And Safety Representative
 - a. Assist with incident evaluation;
 - b. With management, identify cause(s) of incident and identify corrective actions needed to avoid recurrence;
 - c. Review injury/incident report for completeness and accuracy;
- 4. Local Human Resources Representative
 - a. Report work-related injuries and illness to worker compensation carrier
 - (St. Paul Fire and Marine @ 1-800-787-2851);

5. Documentation Summary

- A. File these records in the Office Safety File:
 - 1. Attachment 49-1 Incident Report Form
 - 2. Maintain OSHA 200 Log.
- B. File these records in the Project Health and Safety File
 - 1. Attachment 49-1 Incident Report Form
 - 2. Maintain OSHA 200 Log if applicable for Project.

6. Resources

- A. U.S. OSHA
- B. Attachment 49-1 Incident Report Form

1. Applicability

This standard applies to US-based URS Corporation office and field operations.

2. Purpose and Scope

This standard provides guidance in controlling potential employee exposures to toxic and hazardous substances specifically regulated by OSHA. These substances include:

Asbestos	13 Carcinogens:		
Vinyl Chloride	4-Nitrobiphenyl	•	4-Aminodiphenyl
Inorganic Arsenic	Alpha-Napthylamine	•	Ethyleneimine
Cadmium	Methyl chloromethyl ether	•	beta-Propiolactone
Benzene	3,3'-Dichlorobenzidine	•	2-Acetylaminofluorene
Coke Oven Emissions	Bis-Chloromethyl ether	•	4-Dimethylaminoazobenzene
1,2-dibromo 1-3 chloropropane	beta-Napthylamine	•	N-Nitrosodimethylamine
Acrylonitrile	Benzidine		
Ethylene Oxide			
Formaldehyde			

3. Implementation

Office Locations: Implementation of this standard is the responsibility of the

Office Manager.

Field Activities: Implementation of this standard is the responsibility of the

Project Manager.

4. Requirements

A. Identification of Hazardous Substances

1. Prior to performing any work including; drilling, excavation, demolition, alteration, salvage, repair, restoration, welding, brazing, grinding, or other surface disturbing activities determine if any of the hazardous substances identified in section 2 of this SMS are present in the work area.

- B. Determine the Potential for Employee Exposure to the Hazardous Substance
 - If any of the substances are identified, conduct an exposure assessment based on the type of work to be performed to determine if employees have the potential to be exposed above any action level identified in the substance-specific regulations. This assessment must be reviewed and approved by the Regional Health and Safety Manager.
 - 2. Include the results of the initial exposure assessment in the project/office health and safety plan and/or project/office health and safety file.
- C. Controlling Potential Employee Exposures.
 - Where the initial exposure assessment identifies the
 potential for employee exposures above an established
 action level, develop a project/office specific program to
 address all required regulatory concerns for that
 substance(s). Completed programs and/or guidance
 documents are to be included in project-specific health and
 safety plans.
 - 2. Attachment 50-1 provides a general checklist, to be used in conjunction with the substance-specific standard, to assure the program covers all required areas of concern.

D. Compliance Programs

When compliance programs are required by a specific standard, the following outline shall be utilized unless otherwise directed by the standard:

- 1. Description of work activities that expose personnel.
- 2. Equipment to be used and procedures to be followed during exposure activities.
- 3. Employee job responsibility and crew size during exposure activities.
- 4. Maintenance practices to be followed for servicing and cleaning equipment and disposing of waste.

- 5. Specific instructions on how to set up engineering controls (ventilation; containment; etc.).
- 6. Air monitoring data from initial assessment.
- 7. A detailed work schedule for implementation.
- 8. A description of arrangements made among contractors on multi-contractor sites with respect to informing affected employees of potential exposure.
- 9. Name of Competent Person who will be responsible for performing regular inspections of the job site, materials, and equipment during the job.

The Regional Health and Safety Manager must approve all compliance programs.

E. Training Requirements

- All employees with potential exposure to the substances covered by this SMS must receive appropriate training prior to performing activities that could result in exposure. This training must be performed initially, upon any substantial changes to the operation covered, and annually. In general, the training should cover the following topics unless otherwise indicated by the specific standard:
 - a. Basic Employee Training:
 - Regulated areas: authorizations, entrance restrictions
 - Signs and warnings
 - Container contents identification
 - The nature of the specific hazards
 - The specific operations that could result in exposure
 - The medical surveillance program
 - · Personal protective equipment
 - Hygiene practices and procedures
 - Decontamination practices

- Emergency practices and procedures
- Employee's specific role in emergency procedures
- Recognition and evaluation of potential hazardous situations
- Employee's specific duties and responsibilities
- First aid procedures
- b. Supervisor Training (in addition to basic employee training):
 - · Operations reports required
 - Incident reports required
 - · Medical surveillance program
 - Medical examinations
 - · Records keeping
 - Training program and outline
- 2. All training performed as part of this SMS will be documented and tracked in accordance with SMS 055.

5. Documentation Summary

- A. File these records in the Office Safety Filing System:
 - 1. Hazardous substance list.
 - 2. Approved exposure assessment.
 - 3. Completed "Toxic and Hazardous Substance Checklist" (Attachment 50-1) along with any required guidelines and/or programs.
 - 4. Approved Compliance Program
 - 5. Training Records
- B. File these records in the Project Safety File:
 - 1. Hazardous substance list.

- 2. Approved exposure assessment.
- 3. Completed "Toxic and Hazardous Substance Checklist" (Attachment 50-1) along with any required guidelines and/or programs.
- 4. Approved Compliance Program
- 5. Training Records

6. Resources

- A. Asbestos 29 CFR 1910.1001 and 29 CFR 1926.1101 http://www.osha-slc.gov/OshStd_data/1910_1001.html
- B. 13 Carcinogens 29 CFR 1910.1003 and 29 CFR 1926.1103 http://www.osha-slc.gov/OshStd_data/1910_1003.html
- C. Vinyl chloride 29 CFR 1910.1017 and 29 CFR 1926.1117 http://www.osha-slc.gov/OshStd_data/1910_1017.html
- D. Inorganic arsenic 29 CFR 1910.1018 and 29 CFR 1926.1118 http://www.osha-slc.gov/OshStd_data/1910_1018.html
- E. Cadmium 29 CFR 1910.1027 and 29 CFR 1926.1127 http://www.osha-slc.gov/OshStd_data/1910_1027.html
- F. Benzene 29 CFR 1910.1028 and 29 CFR 1926.1128 http://www.osha-slc.gov/OshStd_data/1910_1028.html
- G. Coke oven emissions 29 CFR 1910.1029 and 29 CFR 1926.1129 http://www.osha-slc.gov/OshStd_data/1910_1029.html
- H. 1,2-dibromo-3-chloropropane 29 CFR 1910.1044 and 29 CFR 1926.1144 http://www.osha-slc.gov/OshStd_data/1910_1044.html
- Acrylonitrile 29 CFR 1910.1045 and 29 CFR 1926.1145 http://www.osha-slc.gov/OshStd_data/1910_1045.html
- J. Ethylene oxide 29 CFR 1910.1047 and 29 CFR 1926.1147 http://www.osha-slc.gov/OshStd_data/1910_1047.html
- K. Formaldehyde 29 CFR 1910.1048 and 29 CFR 1926.1148 http://www.osha-slc.gov/OshStd_data/1910_1048.html



Attachment 50-1

TOXIC AND HAZARDOUS SUBSTANCE CHECKLIST

		Yes	No	N/A
1.	Have hazardous substances present in the workplace been identified?			
2.	Is there a potential for employee exposure above an established action level?			
3.	If the response to question #2 is yes, have you completed a program or developed guidelines to address the following compliance concerns, where applicable, for each identified hazardous substance?			
	Permissible exposure limits			
	Exposure monitoring			
	Regulated areas			
	Compliance program		[
	Respiratory protection			1
	Protective clothing		İ	
	Hygiene			
	Hazard communication			
	Training program			
	Housekeeping			
	Medical surveillance		1	
	Medical removal			
	Recorkeeping			
	Reporting			
	Standard operating procedures			
	Contamination/Waste disposal			
[Emergency response		1	

Attach all program and/or guidance material for items checked "yes" to this checklist (or indicate where the information can be found in the project/office health and safety plan).

Prepared by:	Date:	
Reviewed by:	Date:	
Approved by:	 Date:	

1. Applicability

This program applies to URS projects in which truck-mounted, or other engine powered, drill rigs are used. It is applicable to URS employees and URS owned rigs. For drill rigs operated by contractors, the primary responsibility for drilling safety is with the drilling contractor.

2. Purpose and Scope

The purpose of these guidelines is to provide an overview for working safely around drilling operations with truck-mounted and other engine-powered drill rigs. The procedure addresses off-road movement of drill rigs, overhead and buried utilities, use of augers, rotary and core drilling, and other drilling operations and activities.

3. Implementation

Field Activities

Drill rig safety and maintenance is the responsibility of the drill rig operator. URS employees are responsible for their own safety including recognizing and avoiding drill rig hazards. URS employees that observe a drill rig condition believed to be unsafe shall advise the drill rig operator of the unsafe condition.

4. Safety Guidelines

A. General Guidelines

URS technicians, geologists, engineers, or other field staff assigned to observe drilling operations or collect soil samples should observe the following guidelines:

- Require a meeting at project start-up regarding the drill rig operator responsibility for rig safety and any site and equipment specific safety requirements
- Set up any sample tables and general work areas for the URS field staff to the side of the drill rig (preferably 10 meters away) and not directly behind the rig.
- URS engineers, technician, and geologists shall not assist the drillers with the drilling equipment or supplies and shall not at any time operate the drill rig controls.

B. Movement of Drill Rigs

Before moving a rig, the operator must do the following:

- To the extent practical, walk the planned route of travel and inspect it for depressions, gullies, ruts, and other obstacles.
- Check the brakes of the truck/carrier, especially if the terrain along the route of travel is rough or sloped.
- Discharge all passengers before moving on rough or steep terrain.
- Engage the front axle (on 4x4, 6x6, etc. vehicles) before traversing rough or steep terrain.

Driving drill rigs along the sides of hills or embankments should be avoided; however, if side-hill travel becomes necessary, the operator must conservatively evaluate the ability of the rig to remain upright while on the hill or embankment. The possibility must be considered that the presence of drilling tools on the rig may reduce the ability of the rig to remain upright (raises the center of mass of the rig).

Logs, ditches, road curbs, and other long and horizontal obstacles should be normally approached and driven over squarely, not at an angle.

When close lateral or overhead clearance is encountered, the driver of the rig should be guided by another person on the ground.

Loads on the drill rig and truck must be properly stored while the truck is moving, and the mast must be in the fully lowered position.

After the rig has been positioned to begin drilling, all brakes and/or locks must be set before drilling begins. If the rig is positioned on a steep grade and leveling of the ground is impossible or impractical, the wheel of the transport vehicle should be blocked and other means of preventing the rig from moving or topping over employed.

C. Buried and Overhead Utilities

The location of overhead and buried utility lines must be determined before drilling begins, and the locations should be noted on boring plans and/or assignment sheets.

When overhead power lines are close by, the drill rig mast should not be raised unless the distance between the rig and the nearest power line is at least 20 feet (7 meters) or other distance as required by local ordinances, whichever is greater. The drill rig operator or assistant should walk completely around the rig to make sure that proper distance exists.

When the drill rig is positioned near an overhead line, the rig operator should be aware that hoist lines and power lines can be moved towards each other by wind. When necessary and approved by the Project

Manager (PM), the utility and/or power lines may be shielded, shut down, or moved by the appropriate personnel.

For additional information, please refer to SMS #34 "Utility Clearances and Isolation".

D. Clearing the Work Area

Before a drill rig is positioned to drill, the area on which the rig is to be positioned should be cleared of removable obstacles and the rig should be leveled if sloped. The cleared/leveled area should be large enough to accommodate the rig and supplies.

E. Safe Use of Augers

Never place hands or fingers under the bottom of an auger flight or drill rods when hoisting the augers or rods over the top of another auger or rod in the ground or other hard surfaces, such as the drill rig platform.

Never allow feet to get under the auger or drill rod while they are being hoisted.

When the drill is rotating, stay clear of the drill string and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.

Move auger cuttings away from the auger with a long-handled shovel or spade; never use hands or feet.

Never clean an auger attached to the drill rig unless the transmission is in neutral or the engine is off, and the auger has stopped rotating.

Do not wear loose clothing or jewelry while working near the drill rig. Long hair must be pulled back to avoid entanglement with moving parts.

Hearing protection is required when working near an operating drill rig.

F. Safe Use of Hand Tools

Regulations regarding hand tools should be observed in addition to the guidelines provided below:

- Each tool should be used only to perform tasks for which it was originally designed.
- Damaged tools should be repaired before use or discarded.
- Safety goggles or glasses should be worn when using a hammer or chisel. Nearby co-workers and by-standers should be required to wear safety goggles or glasses also, or move away.

 Tools should be kept cleaned and stored in an orderly manner when not in use.

G. Safe use of Wire Line Hoists, Wire Rope, and Hoisting Hardware

Safety rules described in Title 29 Code of Federal Regulations (CFR) 1926.552 and guidelines contained in the Wire Rope User's Manual published by the American fron and Steel Institute shall be used whenever wire line hoists, wire rope, or hoisting hardware are used. The driller should provide written reports (upon request) documenting inspections of equipment.

H. Traffic Safety

Drilling in streets, parking lots or other areas of vehicular traffic requires definition of the work zones with cones, warning tape, etc. and compliance with local police requirements.

I. Fire Safety

- Fire extinguishers (type ABC) shall be kept on or near drill rigs for fighting small fires.
- If methane or other flammable gases or vapors are suspected in the area, a combustible gas indicator (CGI) shall be used to monitor the air near the borehole with all work to stop at 20 percent of the Lower Explosive Limit (LEL).
- Work shall stop during lightning storms.

J. Protective Gear

1. Minimum Protective Gear

Items listed below should be worn by all staff owrking within 30 feet (10 meters) of drilling activities.

- · Hearing Protection;
- · Hard Hat;
- Eye Protection (safety glasses, goggles, or face-shield)
- Safety Shoes (shoes or boots with steel toes)

2. Other Gear

Items listed below should be worn when conditions warrant their use. Some of the conditions are listed after each item.

- Safety Harnesses and Lifelines: Safety harnesses and lifelines shall be worn by all persons working on top of an elevated derrick beam or mast. The lifeline should be secured at a position that will allow a person to fall no more than six feet (2 meters). OSHA Fall Protection (1926 Subpart M) requirements apply.
- Life Vests: Use for work over water.

5. Resources

- A. International Association of Drilling Contractors Safety Alerts http://iadc.org/alerts.htm
- B. Fall Protection SMS 040
- C. Hearing Conservation SMS 026
- D. Subcontractor Health and Safety Requirements SMS 046
- E. Utility Clearances and Isolation SMS 034

Health & Safety Plan Sauget Area 2 Sites Group **Revision No.: 1 Date: 05/25/01**

Soil, Groundwater, and Dust Action Levels and Ionization Potential Tables

APPENDIXC



Saupel Support Samp'ing

"WORST CASE" VAPOR EXPOSURE CALCULATION

the term of the first of the first of the first of

for volatile compounds in soil ...

Carbon in Soil (Irxn)

PARAMETER:

MAXIMUM Water

Vapor Partition Exposure Sat'n vapor Fraction of

O)	Saturation

	CONCENTRN	Solubility	Pressure	Coffsheni	Limit	Pressure*	Total vapor	Concentra						
	in site soil			V.	(OSHA)			1- 41-	N			A		Corrected for
	HOS DESIG			Koc	(OSHA)		in Air	in Air	Name of			Corrected for	Corrected for PID	PID
CONTAMINANT	(mg/Kg)	mg/l	(lorr)	(fraxion)	(ppm)	(ppm)	(percent)	% of PEL	Chemical	1/ppm	ppm	PID Calibrated	Calibrated to Benzene	Calibrated to tsobutytene
												4- 8		Add high #s
Acetone	0.82	3000000	180	0.23	750	14,1	0.05%	1,88%	Anniana	0.00%	1.56E+06	10 Benzene 9.84E+05 Acetone	Add high #s for @min	
Acrylonitrile	1E-09	79000					0.00%	0.00%				5.88E+11	1.00E+10 1.00E+10	
Benzene	61.3	600	95		_	7691.6	25.25%	769158.06%				3.51 Benzene	3,81	5.44
Gromochioromeinane	0.58	10000	300				0.30%	44.02%		0.00%	8.66E+04	4.01 Dauxana	1.00E+10	D, 4-4
Carbon Disutide	0.0963	2000	300	54	4	17.59	0.06%	439.87%	Carbon Disultide	0.00%		9.38E-01 Carbon Disulide	1.00E+10	1.43E+10
Carbon tetrachloride	0.035	800	91	110	,	2.38E+00	0.01%	119,03%	Tetrachloromethana	0.02%		P.45E-01 Calbon District	1.00E+10	1.436+10
Chlorobenzene	539	500	11.8	330	10		8.65%	25354.07%	Chlorobenzana	0.00%	115.57	115.57 Chlorobenzene	115.67	1.85E+02
Chleroform	20.2	7950	248	31	,	1328 23	4,53%	68311.45%	Trichloromethana	2.26%	44,19	110.01 GHOIOGENZENE	110,07	1.000.
Dibromochloromethane	6.9	4700	50	50	1	96.56	0,33%	9656.33%		0.33%	303.44	0.00E+00		
Dichlorobenzenes	1E-09	156	1.47	1700	75	0.0	0.00%	0.00%	Dichtoropenzene	0.00%	6.03E+15	7.84E+15 Dichlorobenzenes	1.00E+10	1.43E+10
1,1-Dichloroethane	1.6	5060	227	30	100	157.37	0.54%	157.37%	1.1-Dichloroethane	0.01%	1.86E+04	0.00E+00 1,1-Dichkroethane	1.00E+10	1.43E+10
1,2-Dichtorpethane	0.435	8524	80	14	10	2.16E+01	0.07%	215.78%	1,2-Dichlorpethane	0.01%	1.38E+04	0.00E+00 1.2-Dichloroethane	1.00E+10	1.43E+10
1,1-Dichloroethene	1E-09	2500	591	65	1	2.39E-07	0.00%	0.00%	Vinylidene chloride	0.00%	1.22E+11	8.57E+10 1.1-Dichloroelhene	1.00E+10	1.43E+10
1.2-Dk:hlorgethene	15	800	200	59	200	4180.61	14.27%	2090.31%	1.2-Dichloroethene	0.07%	1.40E+03	9.81E+02 1,2-Dichloroelhene	9.81E+02	1.40E+03
1,4-Dloxane	1E-09	2000000	30	3.5	25	2.82E-10	0.00%	0.00%	1.4-Dioxana	0.00%	2.80E+15	2.60E+15 1.4-Digxane	1.00E+10	1.43E+10
Ethyl Benzene	80	150	7.1	1100	100	226.43	0.77%	225.43%	Elhyl Benzene	0.01%	1.29E+04	1.50E+04 Ethylbenzene	1:00E+10	1.43E+10
Ethyl Chloride	1E-09	5740	900	11	1000	9.38E-07	0.00%	0.00%	Ethyl Chloride	0.00%	3.13E+13	0.00E+00 Ethyl Chloride	1.00E+10	1,43E+10
Forms/dehyde	1E-09	400000	- 10	3.6	0.3	4.57E-10	0.00%	0.00%	Formaldehyde	0.00%	1.92E+13		1.00E+10	1.43E+10
Methyl Butyl Ketone	1E-09	5000000	3.8	9.8	5	5.10E-12	0.00%	0.00%	Methyl Butyl Kelone	0.00%	2.87E+16	1.49E+18 Methyl Butyl Ketone		1.43E+10
Methyl Chlorida	1E-09	4800	3756	35	50	1.47E-05	0.00%	0.00%	Chloromethane	0.00%	9.96E+11	0.00E+00 Methyl Chloride	1.00E+10	1.43E+10
Mathyl Ethyl Ketone	14	3560000	100	4.5	200	5.75E+00	0.02%	2.87%	Methyl Ethyl Ketone	0.00%	1.02E+08	5.81E+05 Methyl Ethyl Kelone	1.00E+10	1.43E+10
Malhylana Chlorida	10	13000	435	8.8	50	2501.08	8.54%	5002.12%	Dichloromethane	0.17%	588.78	Melhylene Chloride	*****	
Nephihalene	1240	31.7	0.082	400	10	107.9	0.37%	1078.71%	Naphthalene	0.04%	2.72E+03	5.35E+03 Naphihalana	5.35E+03	7.64E+03
Mirchenzene	1E-09	1900	0.15	33	1	0.0	0.00%	0.00%	Närobenzene	0.00%	1.86E+14	0.00E+00	1.00E+10	1.43E+10
Phenol	5708.15	87000	0.2	14.2	5	6.08E+01	0.21%	1215.65%	Phenol					
Styrene	1E-09	300	7	365	50	4.20E-09	0.00%	0.00%	* Styrene	0.00%	3,48E+14	3.38E+14 Styrene	1.00E+10	1,43E+10
Tetrachlorpathane	0.581	2900	7	118	1	7.82E-01	0.00%	78.17%	Teirachloroelhane	0.00%	3.75E+04	0.00E+00 Tetrachloroalhane	1.00E+10	1,43E+1D
Tetrachloroethylene	58.6	150.3	18.49	364	25	1302,67	4.45%	5210.69%	Perchloraethylene	0.18%	862.33	4.22E+02 Tetrachloroathylene	4.22E+02	8.D3E+02
Tokiene	118	500	25	300	50	1293,58	4.41%	2587.15%	Toluene	0.09%	1.13E+03	1,13E+03 Toluene	1.13E+03	1.62E+03
Triethylamine	1E-09	15000	54	11.3	t	2.10E-08	0.00%	0.00%	Triethylamine	0,00%	1,40E+12	1.24E+12	1.00E+10	1.43E+10
1,1,1-Trichtorgethane	1.69	4400	124	152	350	2.06E+01	0.07%	5.89%	Methyl Chloroform	0.00%	4.98E+05	2.49E+05	1.00E+10	1.43E+10
Trichloroethylene	3.85	1100	75	128	50	137.03	0.47%	274.06%	Trichloroethene	0.01%	1.07E+04	9.52E+03 Trichloroethylens	1,00E+10	1.43E+10
Vinyl Chloride	1E-09	1100	760	57	1	7.978-07	0.00%	0.00%	Vinyl Chloride	0.00%	3.68E+10	1,84E+10 Vinyi Chlorida	1.00E+10	1.43E+10
Xylene	540	130	. 6.6	240	100	7513.53	25.64%	7513.53%	Xylene	0.26%	389.98	436.78 Xylene	4.37E+02	6.24E+02

Combined Volatile Level (ppm) 29,301,52 100,00% Fraction of Combined Exposure Limit

8,967.43 Times Limit for Exposure

3.81

"WORST CASE" VAPOR EXPOSURE CALCULATION

1) P* = 1,316 * Conon * PVap / (Solub * Foc * Koc)

2) 4 Exp . P. / PEL

Concn = Soil Concentration of Conteminant

PVap = Vapor Pressure of Pure Chemical

P = Vapor Pressure of Contembrant over Soll Solub = Saturation Water Solubliffy NOTE: Empossibly high solubilities appear for ketones to allow calculation

Foc = Fraction of Soil that is Organic Carbon

Koc # Organic Carbon Partition Coefficient (for the chemical)

Action level for total vapor based on cmpd closest to its PEL, including PID response, calibrated to Benzene

3.81

5.44

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Sauget Support Sampling	WORST CAS for volable of			ALCULATION	l							•
PARAMETER:	MAXIMUM			Exposure	Saturation	Fraction of	Saturation					•
	CONCENTRIN	Solubility		Limit	Concentrin	Total vapor		NAME OF CHEMICA	L			
CONTAMINANT	(site water)		When Pure	(OSHA)	in Air	in Air	in Air				Corrected for	Corrected for PID
CONTAMINANT	(ug/l)	անդ	(torr)	(ppm)	(p p m)	(% by ppm)	% of PEL	•			PID Catibrated	Calibrated to Benzena
Acetone		*****	400	750							to Benzene	Add high #s for @min
	0.18 1E-09	3000000	180	/50	0 000	0.00%	0.00%	Acelone	0.00%	1 37€+08	8.64E+07 Acetone	8.64E+07 1.00E+10
Benzena	4.3	600	75	1	0.707	27.21%	70.71%	Benzene	0.27	3.67	3.67E+00 Benzene	3,67
Bromochkromethane	0.001	10000	300	200	0.000	0.00%	0.00%	Bromachioromethana	0.00%	1.32E+07	0.00E+00 Bromochlaramethane	1.00E+10
Carbon Disulfide	1E-09	2000	300	4	0.000	0.00%	0.00%	Carbon Disutfide	0.00%	5.27E+10	7.42E+08 Carbon Disulfide	7.42E+08
Carbon Tetrachloride	0.031	600	₽1	2	0.005	0.18%	0.23%	Tetrachloromethane	0.09%	1.12E+03		1.00E+10
Chlorobenzene	3.1	500	11.8	10	0.098	3.70%	0.96%	Chlorobenzene	0.37%	2.70E+02	2.70E+02 Chlorobenzene	2.70E+02
Chloroform	3	7950	248	2	0.122	4.70%	6.11%	Trichloromethane	2.35%	4.25E+01		1.00E+10
Dibromochloromethane	1E-09	4700	50	1	0.000	0 00%	0.00%	Chlorodibromometha	0.00%	1.88E+11	0.00E+00 Dibromochloromathane	1.00E+10
Dichlorobenzenes	1E-09	156	1.47	75	0.000	0.00%	0.00%	Dichlorobenzene	0.00%	1.57E+13	2.D4E+13 Dichlorobenzenes	2.04E+13
1,1-Dichloroethane	0.003	5060	227	100	0.000	0.01%	0.00%	1,1-Dichloroeihane	0.00%	1.47E+08	0.00E+00 1,1-Dichlorpethane	1.00E+10
1,2 Dichloroethane	0.48	8524	90	ş	0.007	0.26%	0.87%	1,2-Dichloroethane	0.26%	3.90E+02	0.00E+00 1,2-Dichtoroethans	1.00E+10
1,1-Dichloroethene	0.01	2500	591	1	0.003	0.12%	0.31%	Vinytidene chloride	0.12%	8.36E+02	5.85E+02 1,1-Dichloroethers	5.85E+02
1,2-Dichloroethana	0.64	800	200	200	0 210	8.10%	0.11%	1,2-Dichloroethens	0.04%	2.47E+03	1.73E+03 1,2-Dichloroethene	1.73E • 03
1,4-Dioxene	1E-09	2000000	30	25	0.000	0.00%	0.00%	1,4-Dioxane	0.00%	3.29E+15	3.29E+15 1,4-Dioxane	3.29E+15
Ethylbenzene	0.84	150	7.1	100	0.052	2.01%	0.05%	Ethyl Benzena	0.02%	4.97E+03	5.76E+03 Ethylbenzene	5,76E+03
Ethyl Chloride	1E-09 1E-09	5740	1000	1000	0.000	0.00%	0.00%	Ethyl Chloride	0.00%	1.13E+13	0.00E+00 Ethyl Chloride	1.00E+10 1.00E+10
Mathyl Butyl Kelone	1E-09	5000000	3.8	5	0.000	0.00%	0.00%	Mathyl Bulyl Kalone	0.00%	1.30E+16	6.76E+15 Methyl Butyl Kelone	8.76E+15
Mathyl Chloride	1E-09	4600	3756	50	0.000	0.00%	0.00%	Chloromethana	0.00%	1.25E+11	0.00E+00 Methyl Chloride	1.00E+10
Methyl Ethyl Ketone	1E-09	3560000	100	200	0 000	0.00%	0.00%	Methyl Ethyl Kelons	0.00%	1.41E+16	8.02E+15 Methyl Ethyl Ketone	8.02E+15
Melhylene Chloride	0.44	13000	435	50	0.019	0.75%	0.04%	Dichloromethane	0.00%	6.71E+03	0.00E+00 Methylene Chloride	1.00E+10
Naphthalene	1E-09	31.7	0.082	10	0.000	0.00%	0.00%	Naphthalena	0.00%	7.64E+12	1.50E+13 Naphthelene	1.50E+13
Propylene Dichloride	1E-09	2600	40	75	0.000	0.00%	0.00%	Propene Dichloride	0.00%	9.63E+12	1.002 10 (10)101010	1.00E+10
Styrene	0.05	300	7	50	0.002	0.08%	0.00%	Styrene	0.00%	8.47E+04	8.21E+04 Styrene	8.21E+04
Tetrechloroethane	1E-09	2900	7	1	0.000	0.00%	0.00%	Tetrachiprosthane	0.00%	8.18E+11	0.00E+00 Tetrachloroethane	1.00E+10
Tetrachioroethylene	0.47	150.3	18,49	25	0.078	2.93%	0.30%	Tetrachloroethena	0.12%	8.54E+02	6.41E+02 Tetrachloroethylene	6.41E+02
Toluene	7.3	500	25	50	0.480	18.48%	0.96%	Toluene	0.37%	2.71E+02	2.71E+02 Toluene	2.71E+02
1.1.1-Trichloroethane	0.051	4400	124	350	0.002	0.07%	0.00%	Mathyl Chloroform	-0.00%	4.81E+05	21.12.00	1.00E+10
1.1.2-Trichloroethene	1E-09	4500	25	10	0.000	0.00%		1.1.2-Trichloroethane	0.00%	3.56E+12		1.00€+10
Trichtoroethylene	0.8	1100	75	50	0.072	2.76%	0.14%	Trichtoroethene	0.06%	1.81E+03	1.61E+03 Trichloroethylene	1.81E+03
Vinyl Chloride	0.79	1100	760	1	0.718	27.63%	71.80%	Vinyl Chloride	0.28	3.62	1.81E+00 Vinyl Chloride	1.81
Xylene	0.4	130	8.6	100	0.027	1.03%	0.03%	Xylene	0.01%	9.73E+03	1.09E+04 Xylene	1.09E+04
	0.4		0.0	,	4.027	1.447	00/4	.,,,,,,,,	3.4.7	3.62		1.81
		Combined V	olatiles Level ((maa)	2.60	100.00%				7.72		Action level for total va Act
	•				mbined Expos		1.524					based on cmpd closes bas
											*	to the CEL look dies to the

"WORST CASE" VAPOR EXPOSURE CALCULATION

1) P* = 1,000,000 * Concn * PVap / (Salub * 760)

2) % Exp = P*/PEL

Contra Water Concentration of Contaminant

PVap = Vapor Pressure of Pura Chemical

Solub = Saturation Water Solubility NOTE; Impossibly high solubilities appear for ketones to allow calculation

Action level for total va Action level for total vapor based on cmpd doses based on cmpd closest to its PEL, including PID response, calibral PID response, calibral of Benzene to Isobutylene

1.23E+08 1.43E+10 5.25 1.43E+10 1.D6E+09 1.43E+10 3.88E+02 1.43E+10 1.43E+10 2.92E+13 1.43E+10 1.43E+10 8.38E+02 2.47E+03 4.70E+15 8.23E+03 1.43E+10 1.43E+10 9.65E+15 1.43E+10 1.15E+16 1.43E+10 2.15E+13 1.43E+10 1.17E+05 1.43E+10 9.15E+02 3.87E+02 1.43E+10 1.43E+10 2.30E+03 2.58 1.58E+04 2.58

Sauget Support : Sampting

JST EXPOSURE CALCULATION WORKSHEET

Safety factor for this site =

5

	·				
			Exposure Limit	Dust Quotlent	
	Exposure	Maximum Soil	Based on	for	Problem from
	Limit	Concentration	Single Compound	Each Compound	Single Compound
Chemical	(mg/m3)	(mg/kg)	(Em\gm3)	(leveMlmit)	(5mg/m3)/ELmhi
	(mgmo)	(2.46E-01
	5	49200	2.03E+01	9.84E+03	2.40E-01 3.33E-01
Aluminum	0.5	8680	1.50E+01	1.33E+04	3,33E-01 15.00
Antimony	0.01	6000	0.33	6.00E+05	***
Arsenic	0.5	45900	2.18	9.18E+04	2.30
Barlum		1530	0.28	7.85E+05	19.13
Beryillum	0.002	294	3.40	5.88E+04	1.47
Cadmium	0.005	985	1.02E+03	1.97E+02	4,93E-03
Celcium Oxlde	5	1E-09	1.20E+18	1.67E-11	4,17E-18
Cs-137(pCM)	6D	1E-09	2.00E+14	1.00E-09	2.50E-14
Chlordane	1	1E-09	1.00E+14	2.00E-09	5.00E-14
Chromlum	0.5	1E-09	2.00E+12	1.00E-07	2.50E-12
Chrome (hex)	0.01	180	2,22E+01	9 DOE+03	2.25E-01
Coball	0.02	81800	2,18	9.18E+04	2,30
Copper	1	3180	3.14E+02	8.38E+02	1.59E-02
Cyanides	5	1E-09	3,00E+15	6.67E-11	1.67E-15
DIA	15	0.21	9.52E+04	2.10E+00	5.25E-05
Endosulian	0.1	1E-09	5.00E+14	4.00E-10	1.00E-14
Fluorides	2.5	36500	5.48E+01	3.65E+03	9.13E-02
Iron Oxide Furne	10	32400	0.31	6.48E+05	16.20
Lond	0.05	1E-09	3.00E+15	6.67E-11	1.67E-15
Megnesium Oxide		36500	5.48	3.85E+04	9.13E-01
Manganese	. 1	36300 487	2.14E+01	9.34E+03	2.34E-01
Marcury	0.05	15100	1.32E+01	1.51E+04	3.78E-01
Nickel	1	1E-09	1.00E+15	2.00E-10	5.00E-15
Oil Milel	5	57093	1.78	1.14E+05	2.85
PCB#	0.5	1E-09	4 00E+13	5.00E-09	
PNAs	0.2	260	3.85E+03	5.20E+01	1.30E-03
Phthalates	. 5	1E-09		6.67E-11	1.67E-15
Polassium Oxide	15	1E-09	6.00E+11	3.33E-07	
Pu-239(рСИ)	0.003	1E-09		3.33E-08	
Ra-226(pCM)	0.3	1E-09	3.00E+14	8.67E-10	
RDX	1.5	8890		4.45E+04	
Selenium	0.2	150		3.00E+03	7.50E-02
Silicon Dilaxide	0.05	348	• • • • • • • • • • • • • • • • • • • •	3.48E+D4	8.70E-01
Silver	0.01			5,00E-10	1.25E-14
Sodium Oxide	2			5.38E+0	
Sr-90(pCV)	8			1.00E-09	
Sulfur Trioxide				2.10E+0	5.25E-03
Thatlium	0.1			3.33E-0	
Th-230(pCM)	0.003			1.30E+0	3.25E-03
Tin	2		' ::::: ii	1.10E+0	
THankun	10	'	·	1.43E-0	8 3.57E-13
Thillyopenzene	0.07	:=		2.00E-0	
Preufolotilent	0.5			3.88E+0	g 97.00
Venadium	0.05			1,42E+0	4 3.55E-01
Zinc		, ,1000	Sum	6.44E+0	6
			Sun		

Dust Exposure Level at PEL for Mixture .

0.03

EQUATIONS USED IN THIS CALCULATION

Dust action fevel =

(1E+6)(Exposure Limit mg/m3)

(For one dust)

(Concentration mg/kg)(Safety Factor)

Dust action level =

(1E+B) / (Safety Factor)

(For mixed dusts)

Sum of [(Concentration mg/kg) / (Exposure Limit)]

Site Characterization Program

 PID Action Levels for Compound of Greatest Concern	PID Calibrated to Benzene PPM	PID Calibrated to Isobutylene PPM
Water Vapor	1.8	2.6
Soil Vapor	3.8	5.4

min-RAM Action Level for Compound		
of Greatest Concern	(mg/m3)	
Dust Level	0.03	

IONIZATION POTENTIAL TABLES

Acetaldehyde	eV 10.21	2-bromobutane	eV 9.948
Acetamide	9.77	1-bromobutanone	9.54
Acetic Acid	10.35	1-bromo-2-chloroethane	10.63
Acetone	9.69	Bromochloromethane	10.77
Acetonitrile	12.22	Bromodichloromethane	10.88
Acetylene	11.41	Bromoethane	10.24
Acetylene dichloride	9.80	Bromothene	9.8
Acrolein	10.10	Bromolorm	10.51
Acrylic acid	10.09	1-bromo-3-ћехалопе	9.26
Acrylonitrile	10.9	Bromomethane	10.53
Allene	9.83	Bromomethyl ethyl ether	10.08
Allyl alcohol	9.67	1-bromo-2-methylpropane	10.09
Allyl chloride	10.20	2-bromo-2-methylpropane	9.98
Aminoethanol	9.87	1-bromopentane	10.10
Ammonia	10.15	1-bromopropane	10.18
Aniline	7.7	1-bromopropene	9.30
Anisole	8.2	3-bromopropene	9.7
Arsine	10.6	2-bromothiophene	8.63
Benzaldehyde	9.53	o-bromotoluene	8.7
Benzene	9.245	m-bromotoluene	8.8
Benzenethiol	8.33	p-bromotoluene	8.8
Benzonitrile	9.7	1, 2-butadiene	9.5
Benzotrifluoride	9.68	2, 3-butadione	9.2
Benzyl chloride	10.16	n-butanal	9.8
Biphenyl	8.27	2-butanal	9.7
Bromobenzene	8.98	n-butane	10.6
1-bromobutane	10.13	1-butanethiol	9.1
HNU Systems, Inc. D			8-1

2-butanone	eV 9.53	Caprolactam	eV 5. 9.86
iso-butanol	10.47	Carbon disullide	10.07
sec-butanol	10.23	Carbon tetrachloride	11.47
tert-butanol	10.25	Carbon dioxide	13.79
2-butanol	10.1	Carbon monoxide	14.01
1-butene	9.58	o-chloroiodobenzene	8.35
cis-2-butene	9.13	1-chloro-2-methylbenzene	8.72
trans-2-butene	9.13	1-chloro-2-methylbenzene	8.61
3-butene nitrile	10.39	1-chloro-4-methylbenzene	8.78
sec-butyl acetate	9.91	Chloromethylethyl ether	10.08
n-butyl alcohol	10.04	Chloromethylmethyl ether	. 10.25
n-butyl amine	8.71	1-chloro-2-methylpropane	10.66
i-butyl amine	8.70	2-chloro-2-methylpropane	10,61
s-butyl amine	8.70	1-chloropropane	10.82
t-butyl amine	8.64	2-chloropropane	10.78
n-butyl benzene	8.69	3-chloropropene	10.04
i-butyl benzene	8 .68	2-chlorothiphene	8.68
t-butyl benzene	8.68	o-chlorataluene	8.83
Butyl cellosolve	8.68	m-chlorotoluene	8.83
n-butyl mercaptan	9.15	p-chlorotaluene	8.69
i-butyl ethanoate	9.95	Chlorotrifluoroethane	10.4
iso-butyl mercaptan	9.12	Chlorotrifluoromethane	9.73
i-butyl methanoate	10.46	Chlorobenzene	9.07
i-butyne	10.18	Chlorobromomethane	10.77
2-butyne	9.85	1-chlorobutane	10.67
n-butyl acetate	10.01	2-chlorobutane	10.65
n-butyraldehyde	9.86	1-chlorobutanone	9.54

1-chloro-2, 3 epoxy propane	eV 10.60	1, 1-dibromoethane	eV 10.19
Chloroethane (ethyl chloride)	10.97	1,3-dibromopropane	10.07
Chloroethene	1,0.0	o-dichlorobenzene	9.07
2-chloroethoxyethene	10.61	m-dichlorobenzene	9.12
1-chloro-2-fluorobenzene	9.15	p-dichlorobenzene	8.94
1-chloro-3-fluorobenzene	9.21	1, 1-dichloroethane	11.06
1-chloro-2-fluoroethene (cis)	9.87	1, 2-dichloroethane	11.12
1-chloro-2-fluoroethene (trans)	9.87	cis-dichloroethene	9.65
Chloroform	11.42	trans-dichloroethene	9.65
cresols (cresylic acid)	8.83	Dichlorofluoromethane	11.75
Crotonaldehyde	11.84	Dichloromethane	11.35
Crotonaldehyde	9.73	1, 2-dichloropropane	10,8
Cyanoethane	10.91	1, 3-dichloropropane	10.8
Cyanogen bromide	11.95	1, 1-dichloropropanone	9.7
Cyanogen chloride	12.49	2, 3-dichloropropene	9.8
3-cyanopropene	10.39	Diisobutyl Ketone	9.0
Cyclobutane	10.5	Diisopropylamine	7.7
Cyclohexane	9.88	Dimethyl amine	8.2
Cyclohexanone	9.14	2, 3-dimethylbutadiene	8.7
Cyclohexene	8.95	2, 2-dimethylbutane	10.0
Cyclo-octateraene	7.99	2, 2-dimethyl butane-3-one	9.1
Cyclopentadiene	8.58	2, 3-dimethylbutane	10.0
Cyclopentane	10.52	3, 3-dimethyl butanone	9.1
Cyclopentene	9.01	2, 3-dimethyl-2-butene	8.3
Cyclopropane	10.06	3, 5-dimethyl-4-heptanone	9.0
Cyclopropene	9.95	2, 2-dimethyl-3-pentanone	8.9
Dibromoethane	10.49	2, 2-dimethyl propane	10.:

Dimethyl disulfide	eV 8.46	Ethane	eV 11.65
Dimethyl ether	10.00	Ethanai	11.65
N, N Dimethyl formamide	9.12	Ethanol	10.21
Dimethyl sulfide	8.685	Ethanethiol	9.285
p-Dioxane	9.13	Ethanethiol (Ethyl mercaptan)	9.29
Di-n-propyl disulfide	8.27	Ethene (Ethylene)	10.515
Di-n- propyl ether	9.27	Ethyl acetate	10.11
Di-i- propyl ether	9.20	Ethyl alcohol	10.48
Di-n-propyl amine	7.84	Ethyl amine	8.86
Di-n-propyl sulfide	8.30	Ethyl amyl ketone	9.10
Dicyclopentadiene	7.74	Ethyl benzene	8.76
Dibutyl amine	7.69	Ethyl bromide	10.29
Diethoxymethane	9.70	Ethyl butyl ketone	9.02
Diethyl	8.01	Ethyl chloride (Chloroethane)	10.97
Diethyl ether	9.53	Ethyl chloroacetate	10.20
N, N-diethyl formamide	8.89	Ethyl ethanoate	10.10
Diethyl Ketone	9.32	Ethyl disulfide	8.27
Diethyl Sulfide	8.43	Ethyl disulfane	9.4
o-difluorobenzene	9.31	Ethyl formate	10.61
p-difluorobenzene	9.15	Ethyl iodine	9.33
Difluorodibromomethane	11.10	Ethyl mercaptan	9.29
Difluoromethylbenzene	9.45	Ethyl methanoate	10.61
1, 1-dimethoxyethane	9.65	Ethyl isothiocyanate	9.14
Dimethoxyethane	9.65	Ethyl methyl sulfide	8.55
Dimethoxymethane	10.0	Ethyl nitrate	11.22
Diiodomethane	9.34	Ethyl propanoate	10.0
Epichlorohydrin	10.60	Ethyl trichloroacetate	10.44

Ethylene dibromide (EDB)	eV 10.37	n-Heptane	eV 10.07
Ethylene chlorohydrin	10.90	4-Heptanone	9.12
Ethylene oxide	10.565	2-Heptanone	9.33
Ethylbenzene	8.87	n-Hexane	10.18
Ethyne	11.41	Hexafluoroacetone	11.81
Fluorobenzene	9.195	Hexafluorobenzene	9.39
Fluoroethane	12.00	Hexafluoropropene	10.3
Fluoroethene	10.37	2-Hexanone	9.34
Mono-fluoromethanal	11.4	Hexamethylbenzene	7.85
Fluorotribromomethane	11.77	1-Hexene	9.4
o-fluorotoluene	8.91	Hydrazine	9.0
m-fluorotoluene	8.91	Hydrofluoric acid	9.8
Formaldehyde	10.87	Hydrogen	15.4
Formic acid	10.37	Hydrogen Cyanide	13.7
Formamide	10.25	Hydrogen selenide	9.8
Freon 11 (CFCI ₃)	11.77	Hydrogen sulfide	10,4
Freon 12 (CF ₂ CL ₂)	12.31	Hydrogen telluride	9.13
Freon 13 (CF,CI)	12.91	lodine	9.2
Freon 13 B-I	12.08	lodobenzene	8.7
Freon 14 (neat)	16.25	1-iodobutane	9.7
Freon 22 (CHCIF ₂)	12.45	2-iodobutane	9.0
Freon 113 (CF ₃ CCl ₃)	11.78	lodoethane (Ethyl iodide)	9.3
Freon 114	12	lodomethane (Methyl iodide)	9.9
2-furaldehyde	9.21	1-iodo-2-methylpropane	9.
Furan	8.89	1-iodo-2-methylpropane	9.
Furfural	9.21	1-iodopentane	9.
Genetron 101	11.98	1-iodopropane	9.

2:-1	eV 9.17	2-methylpropanal	eV 9.7
2-iodopropane	8.62	2-methyl-2-propanol	8.7
o-iodotoluene .		• • •	
m-iodotoluene	8.61	Methyl acetate	10.27
p-iodotoluene	8.50	2-methylpropens	9.23
Isoamyl acetate	9.90	Methyl acrylate	10.70
Isoamyl alcohol	10.16	Methyl n-propyl ketone	9.39
Isobutane	10.57	Methyl alcohol	10.85
Isobutyl amine	8.70	Methyl styrene	8.35
Isobutyl acetate	9.97	Methyl amine	8.97
Isobutyl alcohol	10.47	Methyl bromide	10,53
Isobutyl formate	10.46	Methyl butyrate	10.0
Isobutylene	9.44	Methyl Chloroacetate	10,35
Isobutyraldehyde	9.74	Methyl chloride	11.28
Isopentane	10.32	Methyl chloroform	11.25
Isopropanol	10.17	Methylcyclohexane	9.85
isopropyi acetate	9.99	4-methylcyclohexene	8.91
Isopropyl alcohol	10.16	2-methyl-1, 3-butadiene	8.85
Isopropyl amine	8.72	2-methybutanal	9.71
Isopropyl benzene	8.75	2-methylbutane	10.31
Isopropyl ether	9.20	2-methyl-1-butene	9.1:?
Isovaleraldehyde	9.71	3-methyl-1-butene	9.51
Methane	12.48	3-methyl-2-butene	8.67
Mesitylene	8.40	Methyl n-butyl ketone	9.34
Mesityl oxide	9.08	Methylcyclopropane	9.80
Methanol	10.85	Methyl dichloroacetate	10.44
Methanethiol	9.44	Methyl disulfide	8.46
2-methylpropane	10.56	Methyl ethanoate	10.27
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Methyl ethyl ether	eV 9.81	Oxygen	eV 12.075
Methyl ethyl ketone	9.53	n-pentane	10.34
Methyl ethyl sulfide	8.55	i-pentane	10.32
2-methyl furan	8.39	Pentachloroethane	11.28
Methyl iodide	9.54	1, 3-pentadiene (cis)	8.65
Methyl isobutyl ketone	9.30	1, 3-pentadiene (trans)	8.56
Methyl isobutyrate	9.98	Pentafluorobenzene	9.84
Methyl isopropyl ketone	9.32	Pentamethylbenzene	7.92
Methyl methacrylate	9.74	n-pentanal	9.82
Methyl methanoate	10.82	2, 4-pentanedione	8.87
Methyl mercaptan	9.44	2-pentanone.	9.39
2-methylpentane	10.11	3-pentanone	9.32
3-methylpentane	10.073	1-pentene	9.50
Morpholine	8.88	Perchloroethylene	9.32
Napthalene (I)	8.12	Perfluoro-2-butene	11.25
Nitric oxide (I)	9.25	Perlluoro-1-heptene	10.48
Nitrobenzene	9.82	n-perfluoropropyl iodide	10.26
Nitroethane	9.92	(n-perfluoropropyl)-	9.9
Nitrogen~	15.6	iodomethane	
Nitrotoluene	10.88	(n-perflucropropyl)- methyl ketone	10.5
Nitromethane	11.08	Phenol	8.5
n-Nonane	10.21	Phenyl ether	8.0
5-nonanone	9.10	Phenyl isocyanete	8.7
n-Octane	10.24	Phosgene	11.7
3-octanone	9.19	Phosphine	10.
4-octanone	9.10	Pinene	8.0
1-octene	9.52	Propadiene	10.1

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eV 9.95	1, 2, 3, 4-tetrafluorobenzene	eV 9.61
10.51	1, 2, 3, 5-tetrafluorobenzene	9.55
11.07	1, 2, 4, 5-tetralluorobenzene	9.39
9.195	1, 2, 4, 5-tetramethylbenzene	8.03
7.69	Tetrafluoroethene	10.12
10.10	Tetrahydropyran	9.26
9.73	Tetrachloroethylene	9.32
8.20	Tetrachloromethane	11.4
9.67	Tetrahydroluran	9.45
9.98	Thioethanol	9.29
10.34	Thiomethanol	9.44
11.84	Thiophene	8.86
10.04	1-thiopropanol	9.20
10.20	Toluene (1)	8.82
10.16	Tribromoethene	9.27
8.78	Tribromomethane	10.51
8.72	1, 1, 1-trichlorobutanone	9.54
9.73	1, 1, 1-trichloroethane	11.25
10.22	Trichloroethene	9.45
9.27	Trichloroethylene	9.45
10.54	Trichloromethyl ethyl ether	10.08
10.36	Trichloromethane	11.42
9.32	Triethylamine	7.50
8.20	1, 2, 4-trifluorobenzene	9.37
8.47	1, 3, 5-trifluorobenzene	9.30
8.65	Trifluoroethene	10.14
11.10	1, 1, 1-trifluoro-2-iodoethane	10.00
	9.95 10.51 11.07 9.195 7.69 10.10 9.73 8.20 9.67 9.98 10.34 11.84 10.04 10.20 10.16 8.78 8.72 9.73 10.22 9.27 10.54 10.36 9.32 8.20 8.47 8.65	1. 2, 3, 4-tetrafluorobenzene 1. 2, 3, 5-tetrafluorobenzene 1. 2, 4, 5-tetrafluorobenzene 1. 2, 4, 5-tetrafluorobenzene 1. 2, 4, 5-tetrafluorobenzene 1. 2, 4, 5-tetramethylbenzene 1. 2, 4, 5-tetramethylbenzene 1. 2, 4, 5-tetramethylbenzene 1. 10 Tetrafluoroethene 1. 10 Tetrafluoroethene 1. 10 Tetrafluoroethylene 1. 20 Tetrachloromethane 1. 20 Tetrachloromethane 1. 34 Thiopene 1. 34 Thiopene 1. 34 Thiopene 1. 34 Thiopene 1. 35 Tribromoethene 1. 37 Tribromoethene 1. 37 Tribromoethene 1. 37 Trichloroethane 1. 37 Trichloroethane 1. 38 Trichloroethylene 1. 39 Trichloroethylene 1. 39 Trichloromethyl ethyl ether 1. 30 Trichloromethyl ethyl ether 1. 35 Trichloromethane 1. 36 Trichloromethane 1. 37 Trichloromethane 1. 38 Trichloromethane 1. 39 Trichloromethane 1. 30 Trichlorometh

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Trifluoroiodomethane	10.40
Trifluoromethylbenzene	9.68
Trifluoromethylcyclohexane	10.46
1, 1, 1-trifluoropropene	10.9
Trimethylamine	7.82
1, 2, 3-trimethylbenzene	8.48
1, 2, 4-trimethylbenzene	8.27
1, 3, 5-trimethylbenzene	8.39
2, 2, 4-trimethyl pentane	9.85
2, 2, 4-trimethyl-3-pentanone	8.82
n-Valderaldehyde	9.82
Vinyl acetate	9.19
Vinyl benzene (styrene)	8.47
Vinyl bramide	9.80
Vinyl chloride	10.00
4-vinylcyclohexene	8.93
Vinyl ethanoate	9.19
Vinyl flouride	10.37
Vinyl methyl ether	8.93
Water (H ₂ O)	12.59
o-xylene	8.56
m-xylene	8.56
p-xylene	8.445